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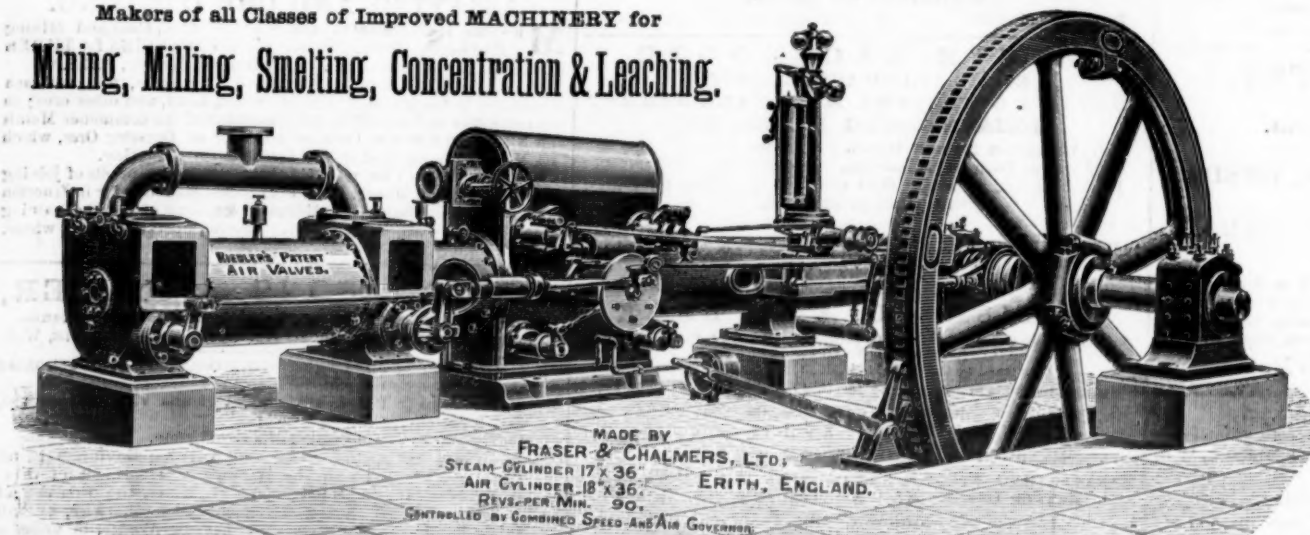
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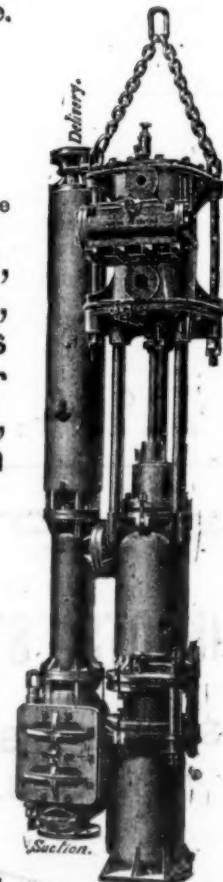
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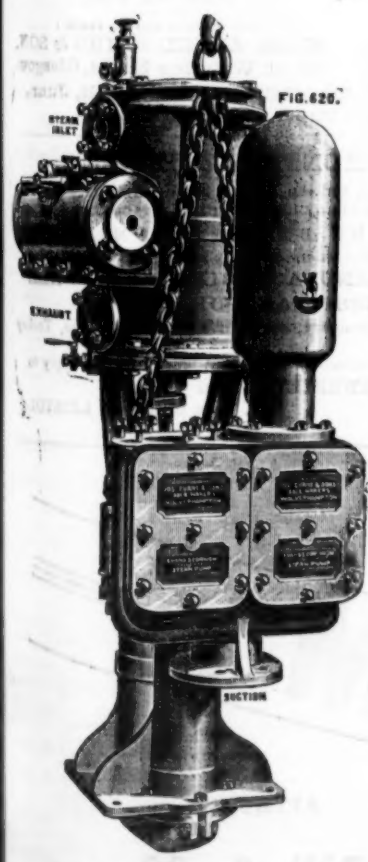
FIG. 875, "FLUOMETER" PATENT STEAM VACUUM PUMP.

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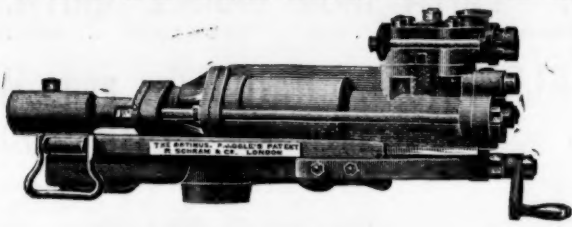
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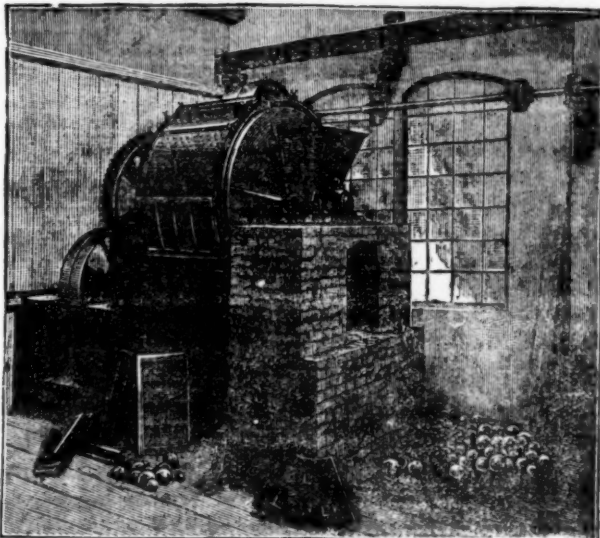
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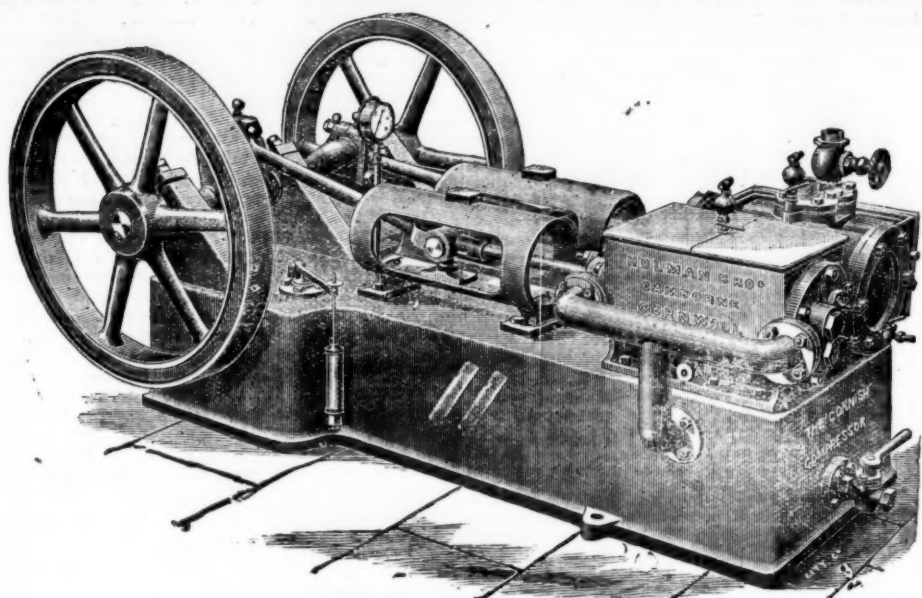
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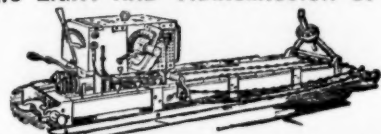
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Jeffrey Machines for Undercutting Coal,
WORKED EITHER BY COMPRESSED AIR OR ELECTRICITY.

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Specially devoted to Cornish Mining, upon which it contains the fullest and most reliable information published. It is the only eight-paged newspaper printed in the Mining Division of Cornwall.

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PRICE ONE PENNY.

The Cornish Post and Mining News Co. (Limited)
East Charles Street, Camborne, Cornwall.

AWARDS: CRYSTAL PALACE, 1890; TASMANIA, 1891; KIMBERLEY, 1892.

CONCENTRATION.

The Clarkson-Stanfield Ore Reduction Co. (Limited).

In the CLARKSON-STANFIELD process of Concentrating Refractory and Complex Ores no water is required; dust is reduced to a minimum; the loss of Mineral through water-borne Slimes is obviated.

OUTPUT $\frac{1}{2}$ TO 2 TONS PER HOUR, ACCORDING TO SIZE OF MACHINE.

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The Machine is superior to Sieves for Sizing Homogeneous Substances, such as Emery, Sand, and Powders, and may be used to great advantage in the preparation of Ochre.

N.B.—The owners of the Carnadochan Mine, near Bala, North Wales, will, by arrangement, show their CLARKSON-STANFIELD plant working on a Refractory Low Grade Gold Ore.

NEW PATENTS.

LIST of APPLICATIONS for New Patents relating to Mining Metallurgical, Engineering, Railway and kindred matters, specially compiled from official sources for the "Mining Journal" by Messrs Rayner and Company, Patent Agents, 27, Chancery Lane, London, W.C., who will forward all information regarding them free on application.

- 1041 William Durra, 282, Ayrill Street, Glasgow.—Improvements in and relating to appliances for feeding water into steam boiler.—May 11.
- 1042 William Phillips Thompson, 6, Lord Street, Liverpool.—Improvements in or in connection with metallic packing for piston rods, valves rods, or the like.—May 11.
- 1043 Reuben Thomas Preston and James Holden, 77, Chancery Lane, London.—Improvements in stays for steam and other boilers.—May 11.
- 1044 Charles Devine, 154, St. Vincent Street, Glasgow.—Improvements in steam engines.—May 11.
- 1045 John Jones, 12, Southampton Buildings, Chancery Lane, London.—An improved method or process for the treatment of gold bearing anti-mony ores.—May 11.
- 1046 John Edward Lewis Ogden, 18, Southampton Buildings, Chancery Lane, London.—Improvements in gauge glass governors for steam boilers and for such like purposes.—May 11.
- 1047 Robert Brice Smith, 27, Liversedge Road, Higher Tranmere, Birkenhead.—Improvements in automatic feedwater regulator, and in steam traps.—May 14.
- 1048 Joseph Butcherworth and Richard Fletcher Christmas Tonge, 5, John Pariton Street, Manchester.—Improvements in metallic packings.—May 15.
- 1049 Charles Wood and Albert Charles Caddick, 814, Grimesthorpe Road, Sheffield.—An improvement in four-way valves for regenerating or other furnaces.—May 11.
- 1050 Norman Dakin, 103, Oslodonian Road, Leeds.—Improved valves for steam engines.—May 11.
- 1051 David Rushworth, 82, Manchester Old Road, Heaton Chapel, near Stockport.—Improvements in or relating to "fuel economisers" or apparatus for heating the feedwater for steam boilers.—May 14.
- 1052 Adolf Gutensohn, 1, Queen Victoria Street, London.—An improved process and means used therein for the disintegration of quartz and similar minerals.—May 14.
- 1053 Richard Ernest Bradford, 3, Meath Street, Battersea Park Road, London.—Improvements in compound fluid pressure motive power engines.—May 15.
- 1054 James Outhill, 4, Reform Street, Dundee.—Improvements in and relating to metallic packing for piston rods and the like for fluid pressure engines and machines.—May 15.
- 1055 William Amrose Bennett, 53, Chancery Lane, London.—Improvements in metallic packings.—May 15.

JOINT-STOCK COMPANIES.

NEW REGISTRATIONS.

THE following are among the joint-stock companies registered at Somerset House since our last notice:—

Cripple Creek Gold Mines Development (Limited)—Registered May 11 by Maddison, 1, King's Arms Yard, E.C., with a capital of £100,000 in £1 shares. Objects: To purchase, lease, or otherwise acquire and take over, or to obtain options over gold mines, mining leases, claims, water and other rights and properties situated in Colorado, in the United States of America or elsewhere; and further to acquire and turn to account any freehold lands, farms, estates, mines, mining, water, and other rights, leases, claims, concessions, options of purchase, alluvial ground, metalliferous land, &c.; to develop and turn to account the same in such manner as the company shall see fit; and to carry on the business of a mining, milling, smelting, and metallurgical company in all or any of its branches; to construct, maintain and work rail and tram roads; to employ and dispatch prospecting and exploring expeditions; to develop and turn to account such lands, &c., as may from time to time be acquired by the company, by clearing, draining, farming, building thereon, &c.; to carry on business as bankers, capitalists, financiers, company promoters, metal workers, builders and contractors, engineers, farmers and graziers, horse and cattle dealers, coach proprietors, traders, shipowners, storekeepers, importers, and exporters, &c., in all or any of their respective branches. The first directors—to be not less than three nor more than seven—are to be nominated by the subscribers. Qualification, 100 shares. Remuneration, £100 each per annum, and a percentage of the profits divided between them, and Chairman £50 per annum extra.

Central Ore Reduction Company of Western Australia (Limited)—Registered May 11 by Harwood and Stephenson, 31, Lombard Street, E.C., with a capital of £150,000 in £1 shares. Objects: To acquire by purchase or otherwise ores, metals, and mineral substances of all kinds; to crush, dress, size, concentrate, cyanide, smelt, refine, and prepare the same for market or for subsequent operations; to sell, dispose of, or otherwise deal with the same; to prospect and explore mines and grounds supposed to contain ores, metals, or mineral substances, and to carry on the business of custom, milling, prospecting, miners, assayers, ore reducers, refiners; metallurgists, machinists, brick, and tile merchants, &c. The first directors—to be not less than three nor more than seven—are to be nominated by the subscribers. Qualification 500 shares. Remuneration £100 each per annum, and a percentage of the profits divided between them, Chairman £50 per annum extra. Registered office, 75, Cheapside, E.C.

Hannans Kalgoolie Proprietary (Limited)—Registered May 9 by Burn and Beridge, 11, Old Broad Street, London, E.C., with a capital of £375,000, in £1 shares. Object: To adopt and carry into effect an agreement, made February 7, between the Gold Lands Corporation (Limited), of the one part, and O. Fatey, on behalf of this company, of the other part, for the acquisition by this company of certain property therein described; to develop and turn to account the same in such manner as the company shall see fit, and further, to acquire any mines, mining, water and other rights, grants, leases, claims, concessions, options of purchase, metalliferous land, &c., in any part of the world, to develop and turn to account the same in such manner as the company shall see fit, and to carry on the business of a mining, milling, smelting, and metallurgical company in all or any of its branches; to develop the resources of such lands and other properties as may from time to time be acquired by the company by clearing, draining, irrigating, planting, farming, or building thereon; to construct and maintain rail and tram roads,

Great Cement Proprietary (Limited)—Registered May 2 by Bircham and Co., 50, Old Broad Street, E.C., with a capital of £250,000 divided into 250,000 shares of £1 each. Object: To adopt and carry into effect an agreement expressed to be made between A. Mendel and Co. of the one part, and this company of the other part, for the acquisition, by purchase or otherwise, of certain mining claims in the Coolgardie gold field, Western Australia, the leases of which are numbered on the Warden's Registry, Coolgardie, 1914, 1919, 2190, 2191, 2171, and 2182, to develop and turn to account the said properties in such manner as the company shall see fit, and to carry on the businesses of miners and smelters, metallurgists, &c. The first directors—to be not less than three nor more than seven—are to be nominated by the subscribers. Qualification, 100 shares. Remuneration, £250 each per annum and an additional £100 for the Chairman. Registered office, 1, Whittington Avenue, Leadenhall Street, E.C.

CONTRACTS OPEN:

FOR MINE, QUARRY, RAILWAY, AND ENGINEERING WORK, STORES, &c.

*We shall be obliged by being promptly placed in possession of particulars regarding contracts open for competition, and of the results of successful tenders. In the latter case contract prices should be given.

The date given is that by which tenders must be delivered, in nearly all cases further information can be obtained on application at the addresses given. In applying for such the name of "The Mining Journal" should be mentioned as the original source of the information, concerning which further particulars are required.

HOME CONTRACTS.

Railway Wagons. May 27 (India Office).—The Secretary of State for India in Council is prepared to receive tenders to supply wagons. The conditions of contract may be obtained on application to the Director-General of Stores, India Office, Whitehall, S.W., and tenders are to be delivered at that office by 2 p.m. on 27th inst.

Railway Tenders. May 23 (Karlruhe).—For the supply of 10 six-wheel tenders, for the Baden State Railways. Tenders by 23th inst.

Coal. May 23 (Bristol).—Messrs. Pountney and Co. (Limited), Victoria Pottery, Bristol, invite quotations for the supply of coal for ensuing 12 months—viz., large, nut, and small. Full particulars upon application.

Shaft. May 25 (Tredgar, Mon.).—For immediate sinking and completion of a winding shaft in the Rhymney Valley at a point as near as practicable to the Brecon and Merthyr Railway, for the Tredgar Iron and Coal Company (Limited). Specifications, drawings, and full particulars may be inspected and copied at the company's office at Tredgar, where also forms of tender may be obtained. The contractors must undertake (to purchase from the Tredgar Company at fixed rates any materials which the company is liable to supply.

Coal. June 2 (Aberdare).—The Aberdare Gas Company will require about 4500 tons of gas coal per annum, as per schedule and specification to be obtained on application to the company. Tenders, addressed to the Chairman, received up to June 2. Mr. Evan Jones, secretary and manager.

Tug Boat. June 12 (Belfast).—For the construction and supply of a twin screw tug-boat, for the Belfast Harbour Commissioners. Copies of specification, form of tender, and any further information required may be obtained at the Harbour Office. Sealed tenders, on the special forms provided for the purpose, to be addressed to Mr. W. A. Currie, secretary, Harbour Office, Belfast, enclosed "Tender for Tug Boat," and sent in by June 12.

The registered office of the GREAT LAXBY MINING COMPANY (LIMITED) has been removed from 20, Finsbury Circus, E.C., to No. 184, Gresham House, Old Broad Street, E.C., and Mr. John Jameson Truran has been appointed London secretary.

THE COAL DEPOSITS OF THE NORTH-WEST TERRITORIES OF CANADA.

IN PARTICULAR THE LIGNITE DEPOSIT OF THE SOURIS VALLEY.

By W. HENRY, M.E.

NO apology is needed for laying great stress upon the importance of the above subject, the greater portion of the North-West, available for settlement, being a treeless plain, and wood for fuel being more difficult to obtain year by year.

The centres of population are now largely supplied with coal, and the demand for this will increase each year. The fact that a winter of six or seven months' duration has to be provided for in Manitoba and the North-West Territories makes it obvious that one of the most important questions to a settler there is the supply of fuel. The obtaining of wood for the purpose has been to many a long and tedious task; the wood having sometimes to be hauled great distances, even 50 or 60 miles. As these coal deposits lie in the treeless portions of the North-West Territories, and as in 80 per cent. of cases no district is more than a few miles distant from some railway, it is obvious that Nature has bountifully supplied a perfect substitute for wood as fuel, and also a fuel which must largely take the place of all other coals, all of which have to be brought great distances by rail or water, or by both.

The nearest bituminous coal comes from Lethbridge, 700 miles west of Winnipeg, and the nearest hard coal comes from Anthracite, about 1000 miles west of here. The only other possible sources of coal supply for Manitoba are at still greater distances, i.e., from Ohio and Pennsylvania in the United States. In consequence, coal of all kinds other than Souris or lignite coal brings a high price in all parts of the country, and constitutes a serious tax on the people.

The Souris coal fields, which are only 280 miles from Winnipeg, were discovered when the first American and Canadian Boundary Commissioners were locating the International Boundary about 23 years ago. Large deposits of good lignite coal were found in the Souris district, but owing to the want of railway facilities these coal fields remain undeveloped, except in a small way by the settlers who were living near there until recently, when the Government of this province, recognising the

been built in the autumn of the year 1894, before which the coal could only be sold to the settlers, who hauled it from the mines with teams.

The Provincial Government of Manitoba is now using this coal to heat its public buildings at Winnipeg and Brandon, having now used it for two winters, and the Dominion Government is also using it in some of their public institutions, and will use it in many of them, and many large concerns which are large consumers of coal are anxious to use this coal as soon as an assured supply can be guaranteed.

In this connection it may be interesting to note the prices of coal in Winnipeg during the last few years, and the consumption of the various coals in the North-West Territories:—

	Canadian Anthracite.	American Anthracite.	Canadian Bituminous.	American Bituminous.	Lignite.
1876	—	\$24.00	—	\$24.00	—
1881-2	—	19.00	—	17.00	—
1883-4	—	14.25	—	14.00	—
1884-5	—	10.50	—	9.00	—
1885-6	—	10.25	\$8.25	9.00	—
1891-2	—	10.50	7.50	8.50	—
1893-4	\$9.00	9.50	8.00	8.50	\$5.00
1895-6	8.50	8.50	6.50	7.50	4.25

Coal used in North-West Territories:—

	Tons.	Value at Mine.
1887	74,152	\$157,577
1888	115,124	183,354
1889	97,364	179,640
1890	128,953	196,498
1891	174,131	437,243
1892	184,370	469,930
1893	238,395	598,745
1894	199,991	488,980

The above being wholly Canadian coals.

When the Legislature of Manitoba considered the matter of making this lignite coal of such importance that it voted a subsidy of \$150,000 to the C. P. R. in consideration of that company extending its Souris branch from Melita to the new coal fields, it at the same time made it a condition of this grant that the maximum freight rate on the coal to Manitoba points should be as follows:—

For 100 miles or less	\$1.50 per ton.
For 150 miles or less	\$1.75 per ton.
For 200 miles or less	\$2.00 per ton.
For 300 miles or less	\$2.25 per ton.

The latter rate includes Winnipeg.

The freight on American coal from Fort William or Duluth is \$3 per ton, and to this must be added the cost of transportation from the mines in Pennsylvania or Ohio to Fort William or Duluth, together with the cost of transshipment from the cars to boats at Buffalo or Cleveland, and the cost of transshipment and storage at Fort William or Duluth. The freight on Canadian anthracite from the mines at Anthracite to Winnipeg is \$4.50 per ton, and the freight on Galt coal from Lethbridge to Winnipeg is \$3.91 per ton, and at some points west of Winnipeg the freight on western coal (other than lignite) as well as on eastern coal is higher than to Winnipeg. Therefore, the new enterprise started under happy conditions.

It is the lignite of this district that I propose describing, and I will endeavour to prove that here there is a good field for capital, provided it be wisely and carefully used.

The nature and formation of the district is peculiar. On either side of the winding Souris River, which at one time must have been of considerable importance, are banks 10 to 20 feet high, from which spread faults about a quarter of a mile in width, when there is a second series of banks or hills from 80 to 100 feet high, and then commences the stretch of wide, bare, and treeless prairie. Breaking up these further banks, and for the

most part running at right angles to them, are large washouts, technically termed coolies; from the sides of which the different strata are exposed to view, coal, clay, ochres, sandstone, &c. The formation of these coolies can be readily understood. In the first instance, the thawing of winter snows carried down floods of water, which in its course to the river washed out deep gullies, leaving the strata exposed. Now comes the action of fire both accidental and intentional, which ignited the seams of coal, and consumed them in various directions, at the same time burning the intervening clays, the result being fissures on all sides of greater or less extent. This is followed by the renewed action of water in succeeding years, and probably additional fires, the result being still more extensive and eccentric openings, giving the impression of gigantic quarries, which as I have said are called coolies.

There are five exposed seams in the Souris district, the bottom one being 8 feet thick and being about 12 feet below the Prairie level, and the top, which is from 10 to 15 feet below the Prairie level, 4 feet thick, the three centre ones varying from 8 inches to 2 feet in thickness.

The coal in the top and bottom seams is of first-class quality, far superior to its German brother.

The following analysis shows the variation in the eastern and western fields, the lower grades being in the former, and the higher ones in the latter:—

LIGNITE.	
Hydroscopic water	26 to 13 per cent.
Volatile combustible matter	30 to 32 per cent.
Fixed carbon	30 to 51 per cent.
Ash	8 to 4 per cent.

BITUMINOUS.	
Hydroscopic water	5 to 2 per cent.
Volatile combustible matter	27 to 23 per cent.
Fixed carbon	53 to 63 per cent.
Ash	15 to 12 per cent.

THE SEMI AND TRUE ANTHRACITE COAL.

Hydroscopic water	1 to 1 per cent.
Volatile combustible matter	11 to 7 per cent.
Fixed carbon	81 to 89 per cent.
Ash	7 to 5 per cent.

The above analysis will show at once to an expert that the lignite coal contains a large amount of moisture, which, of course, must be driven off before perfect combustion can take place, but this feature is being very successfully met and overcome by the introduction of specially constructed grates, which are already in use, and have proved a perfect success.

To understand this it must be remembered that the moisture in being expelled causes disintegration of the coal, and a finer grate than is used for anthracite coal successfully meets this feature of the lignite coal.

Some 10,000 tons of this coal were sold and used during each of the two seasons last year, and the Canadian stove manufacturers and the stove and furnace dealers thoroughly recognise the importance of thoroughly adapting their stoves and furnaces for the use of lignite coal, so much so that several large stove manufacturers, among whom are the Gurney Tilden Company, of Hamilton, Ontario, the McClary Company, of Montreal and London, Ontario, and the firm of Burrows, Stewart, and Mills, of Hamilton, Ontario, have been giving very special attention to the matter, the last named firm having acquired the right in Canada of manufacturing the special grates in use for some time past in Dakota, where large quantities of the lignite coal are mined and sold; and the other concerns named and others are now arranging to manufacture improved stoves for this market.

Last season the supply of these improved grates and stoves fell far short of the demand, and the fact is now recognised that special stoves for the use of lignite coal is a very important question for stove manufacturers. Although nearly all of this coal heretofore used has been used chiefly in stoves and furnaces built for the use of anthracite coal, a very much larger quantity of lignite coal would have been used during the season now closing if the demand could have been supplied.

When the very low price of lignite is considered as compared with other coal, it is obvious that the greater percentage of all fuel (either wood or coal) used in Manitoba and the eastern portion of the North-West Territories will be the lignite coal.

For the benefit of those to whom the Canadian lignite is unknown, it may be said that this coal is a hard black, with bright oblong fracture, requiring blasting, giving a white flame throwing out great heat. The fire is very difficult to extinguish when the coal is once alight. Personally I am of opinion that it will prove a valuable gas coal of the Cassin order.

The cost of mining in this district is comparatively small, the present system of mining being "drift" mining from and into the bank of the valley. The entire cost of mining, timbering, and management on an output of 100 tons per day should not exceed 80 cents a ton, and the present price per ton for lump coal on car at the mine is \$1.50. There is a large demand springing up for slack for steam purposes, and when it is once understood that nut coal is the fuel for kitchen purposes there will be a largely-increasing sale for this variety. As the mines are driven further under the prairie the quality of the coal is found to improve, and the shipments made during the season of 1895-96 have won for Canadian lignite the reputation of being equal, if not superior, to any ever put upon the market.

But coal is not the only valuable product in this district. Between the seams are magnificent beds of pure clay, entirely free from stone or lumps of any kind, and easily workable. There are several varieties, some of which have not been tested, but are believed to be of value. Among these which have already been experimented upon is a superior fireclay, which lies immediately above the 8 feet seam; from another bed, which is 15 to 20 feet thick, I have myself made bricks with as fine a texture that they can be cut with a saw. As rubber (?) bricks for facing purposes, these would be equal to any in the market. But, perhaps, the most valuable is a terra-cotta clay, which is not only suitable for bricks and tiles, but also for manufacturing into articles of use and ornament, and, as such, would not be excelled by any found in England.

There is ample room for the establishment of an important industry of this kind, and money so invested would certainly produce large and quick returns.

So very little work of the kind being as yet carried on in Canada, and the cost of manufacture promising to be at a minimum, this latter being on account of the fact that the clay and coal necessary for burning it lie close together, and through the natural peculiarities of the district are easily workable. Now, the fact of these lying close to the coal is far more important than it may appear at first. Hitherto the coal mines in this district have been closed during the summer months, and the men discharged, this latter fact making it difficult to get good workmen. But if the clays were utilised as they should be, bricks, &c., would be manufactured from the time the coal trade falls off in the spring till its renewal in the fall, producing all the year round profits to the capitalist, and all the year-round employment to the workmen, enabling a respectable class of men with families to settle in the neighbourhood, they having the assurance that there will be regular and profitable employment. In this connection, it may be pointed out that the question of manufacturing block fuel during the summer from the waste coal is likely to be taken up.

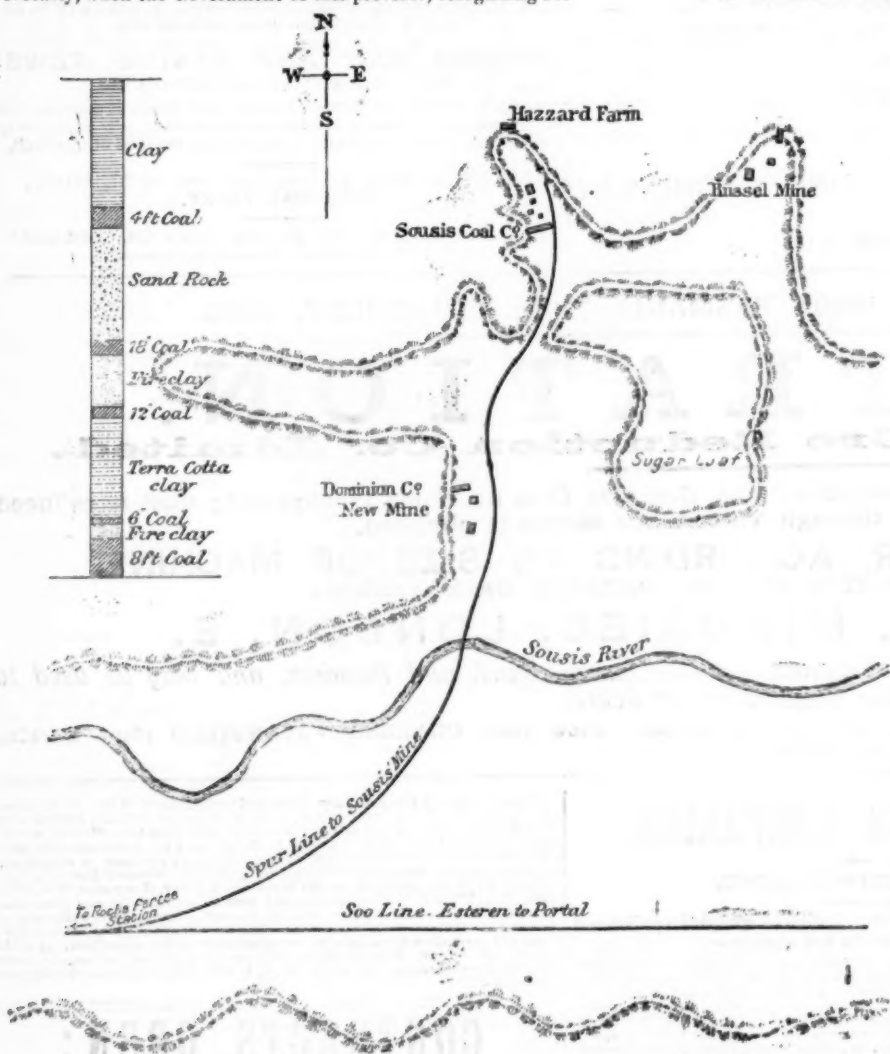
But there is yet another product of this district certain to prove remunerative if properly worked. The fine sand of which the Roche Perce rocks are formed, a bed of which, about 15 feet thick, lies immediately under the 4 feet coal seam.

This could easily and cheaply be converted into artificial stone similar to, and as readily dressed and handled, as Bath stone.

Feeling sure the above particulars will interest some of your readers, especially those on the look out for fresh fields of labour or investment, I am sending you a plan of the district, and also samples of coal, clays, ochres, and sandstone. I am sorry that through the snow still being on the ground I am unable to send specimens of mica and asbestos, each of which is found in the district.

I may add that I shall be very glad to give further information to anyone sufficiently interested to desire it, and if they have any thought of investing shall be pleased to furnish all possible particulars.

We are asked by Messrs. Robert Whyte and Co., the London agents of the Sacke Estate and Mining Company from which company the property called the Midas East Estate and Gold Mining Company was acquired, to state that that company has no connection with the Midas East Extension Company, which is situated in Doornkop, far from the Midas group.



importance of a good and permanent supply of fuel to the community as a whole, entered into an agreement with the Canadian Pacific Railway Company, whereby the latter undertook to extend its Brandon and Souris branch to the above-named coal fields. The consideration paid by the Government for this work was \$150,000, and as a permanent binding condition the rates of freight on coal were limited to a figure that will allow it to be carried to all parts of the province, and sold at a very reasonable price, leaving at the same time a substantial profit to the owners of the mines.

These coal lands are situated in townships two and three in range, six west of the Second Principal Meridian, being in the south-eastern portions of the district of Assiniboia in the north-west territories of Canada, and just west of the western boundary of Manitoba.

These mines are about six miles north of the United States boundary on the "Soo" line of the Canadian Pacific Railway, which runs from St. Paul, Minnesota, to Moose Jaw, on the main line of the C.P.R., and are near the Junction of the "Soo" line with the Souris or south-western branch of the C.P.R., which latter line connects with all the Manitoba branches of the C.P.R.

These mines are the only known good coal properties in Canada between the Galt Mines at Lethbridge (some 400 miles further west) and the coal mines in Nova Scotia.

The coal is first shipped to Estevan (10 miles from Roche Perce) over the "Soo" line, thence over the C.P.R. to Winnipeg and all other Manitoba points, and to Moose Jaw, and thence to points on the main line of the C.P.R. east and west of Moose Jaw.

This coal industry is only in its very infancy, the "Soo" line and the Souris branch of the C.P.R. only having been recently constructed, and the railway switch up to the mines only having

MINING IN VICTORIA.

(FROM OUR OWN CORRESPONDENT.)

MINING matters are quietly but steadily moving in various directions, more particularly on the southern fields and in Eastern Gippsland, and some important results are looked for before long. Large returns of gold are being obtained from numerous mines, and there is a strong probability that the Victorian yield for 1896 will exceed that of any recent year.

I forward the quarterly returns for March as far as they are published:—Ballarat district (central division, Ballarat) shows a falling off of nearly 3000 ounces in the total output of gold, as compared with the previous quarter. Several mines dropped out of the dividend-paying list—only the Last Chance United with £500 and the South Star with £3600 having paid anything back to shareholders. The quantity of quartz treated was 37,778 tons, yielding, together with alluvial (390 ounces) and pyrites (722 ounces), 14,116 ounces of gold. The average yield is 6 dwts. 18 grains per ton, as against 6 dwts. for the preceding term. There is a slight increase in the number of miners employed in the division, the total being 2503. The South Star Mine returned 900 ounces more than in the December quarter, and the decline in the grand total is due chiefly to the lighter yields from the Star of the East and Last Chance Mines. Ballarat district (Blackwood division) shows a gold yield of 722 ounces 5 dwts. 14 grains, of which 288 ounces 14 dwts. was from quartz lodes, and 503 ounces 11 dwts. 14 grains from alluvial workings. This is a slight decrease on the returns for the previous quarter, but is good for the first quarter of the year, when crushing is so much interfered with by reason of the shortness of water.

Maryborough District.—The gold returns for the quarter total 8350 ounces 18 dwts. 22 grains, as against 8224 ounces 10 dwts. for the corresponding quarter of 1894. The total quartz output is 1742 ounces 19 dwts. 20 grains, and the alluvial 7607 ounces 19 dwts. 2 grains. The Chalk's group, in the alluvial, leads the list of gold producers, with the North Driko in a leading position.

No returns are yet to hand of the Gippsland district, with the exception that the returns from a small camp at Bulumwaal, near Bairnsdale, show gold bought during the quarter amounting to 1244 ounces, chiefly from "fossickers" and prospectors. Several rich finds have been reported of late from this locality. One of the largest nuggets which has ever been discovered in Gippsland was found in this district a few months ago by a prospector named Grattan, at Splitter's Creek. The weight of the nugget was 75½ ounces. It was sold to the Bank of Victoria. A good deal of track cutting has been done by the Government to aid the opening up of this portion of Gippsland. The Minister of Mines (Mr. H. H. Foster), believing that Eastern Gippsland is destined to become an extensive gold field, has given instructions for Mr. S. Hunter (one of the Mines' Departments' geological assistants) and three experienced prospectors, well acquainted with alluvial mining and mining, to survey a strip of country two miles wide along the eastern boundary of Victoria. There is every reason to believe that this almost unknown country is highly auriferous, for some important finds have recently taken place at Mallecoota Inlet, the Bemm River, and at Bonang, all near the eastern extremity of Victoria. Mr. Foster tried to induce the New South Wales Government to send a similar equipped party to explore their side of the boundary line, realising that it would be advantageous to both colonies if a payable gold field was found near the border; but as the New South Wales Government are hesitating too long on the matter, the Victorian Surveyor has been instructed to proceed at once with the work.

The quarterly returns from the Bendigo district have not been published yet, but the statistics issued by the Sub-Treasurer (Mr. B. Berry) of Bendigo shows gold purchased by the banks during February, 1896, amounted to 16,412 ounces 11 dwts. 3 grains, as against 11,706 ounces 3 dwts. 19 grains for February, 1895, an increase for 1896 of 4706 ounces 7 dwts. 8 grains. It is anticipated that future returns will show a much greater increase, for since February many Bendigo mines are producing much larger yields—notably the Railway, Shenandoah, Windmill Hill, New Moon, and United Hustlers, whilst numerous other mines in the district are now on golden stone.

On March 30, the dividends paid for the three expired months of the present year of Bendigo Mines was £12,500 in excess of calls for the same period. On the date named, £10,000 was paid in one day in dividends, the best record from Bendigo for some years past.

Lord Brassey, the Governor of Victoria, has been visiting the Bendigo Mines during the Easter Carnival in that city, and has received some sound advice in his speeches to the mining community, on the necessity of keeping a reserve of profit for deep prospecting work, and not go on spending every penny in dividends, and trusting to luck. The usual speech-making on such occasions brought out a deal of information concerning the mines of the district. Mr. McGowan, the legal manager of the South St. Mungo, one of the mines visited, stated that they were now able to pay all expenses on a yield of less than 4 dwts. per ton. Would not some English shareholders of Westralian mines be cheered by a similar assurance from their legal managers, but Bendigo has long earned the honour of being the home of economic mining. The Minister of Mines has it in contemplation to bring out a map of the Bendigo gold field, showing the depth of the various mines, the average yield of gold per ton from the various levels, and the temperature of the mines at different levels. The idea meets with the unanimous approval of all to whom it has been communicated, and, I might add, none will appreciate it more than the Anglo-Australian cum Bendigo mining investors, *The Mining Journal* included.

A discovery of metallic bismuth has just been made at Mount Taylor, about 10 miles from Bairnsdale, in the Gippsland district. The same prospector has succeeded in obtaining samples of oxides of manganese and cobalt, oxide of tin, and reefs containing gold. The quartz reefs running through the porphyritic rock, of which the Mount is composed, have not been hitherto prospected by the ordinary miner, who has a prejudice against them. The prospector, noticing some bright metallic seams in a large quartz vein, brought some to Mr. Donald Clark, at the Bairnsdale School of Mines, who, on examination, proved it to consist of native bismuth coated with carbonate of bismuth.

The Mining Registrar at Jamieson, in the Beechworth mining district, has notified the Mining Department that a few days ago, while some miners were sinking a shaft at Jamieson, they came upon a very rich retaining rock, containing large quantities of quicksilver and cinnabar, and there was every likelihood of its being found in payable quantities. This discovery will recall to mind how a similar find was made some years ago in the Sulphur Bank Mine, California, when mining for sulphur, and the great fortune it brought the proprietors.

The new finds to be recorded are a new reef at Reedy Creek, near Broadford, a locality where some very rich reefs were

worked 35 years ago, and again about a dozen years back—20 ounces to the ton being no uncommon return. A number of leases have been applied for. The other discovery is a reef about 18 inches in width at Sheep Station Creek, from which a crushing of 28 tons has recently been put through for 32 ounces of gold. The reef has been stripped along the surface for about 30 feet, and is described as a splendid surface show, and promises to be one of importance.

Mr. Stirling, Assistant Government Geologist, has just completed a series of observations of temperature, &c., at an extreme depth below sea level—namely, over 2000 feet in Lansell's No. 180 Mine, Bendigo. The observations in the No. 180 Mine will enable a comparison to be made with the recent determinations of Professor Agassiz on the temperature of deep mines in America, and the earlier observations of the late William Jory Henwood, comprised in the eighth volume of the "Transactions" of the Royal Geological Society of Cornwall.

A copy of Mr. Stirling's paper is promised me, when a synopsis will be presented to readers of *The Mining Journal*.

English investors are evidently turning their attention to the Gippsland district. During the past week the directors of the Bonanza Gold Mining Company, at Walhalla, have been approached by the representatives of a London syndicate with a view to purchase. This is only one of many partially developed mines in Victoria wanted for London.

Mr. Cornish's note of warning to promoters in *The Mining Journal* of February 29 last has been reprinted and sent to every mining board, mining registrar, and newspaper in Victoria. It has struck terror into the hearts of some, and a few would have been glad not to have seen old memories revived. Its publication occurred not a day too soon, for every mail steamer carries some enthusiastic promoter to London.

Last week a fire occurred at the Woah Hawp Canton Mine, Ballarat East, owned by a Chinese company, most of the shares being held in Melbourne. The mine manager (Mr. George Deveson) reports that the machinery, boilers, and plant generally have been rendered completely useless by the flames. The shaft has been damaged to a depth of 300 feet. The loss by the fire is estimated at not less than £4000. The claim was being worked on tribute, and excepting 13 Europeans all the hands engaged were Chinese. The stoppage of the pumps at the Woah Hawp Canton had given alarm to the managers of mines on the same line—in particular to the North Prince Regent Company.

P.S.—Monthly returns for March of gold purchased by banks at Bendigo from sub-treasurer, just to hand at closing of mail, is as follows:—

	Ounces.	dwt.	grains.
March, 1895	16,723	14	11
March, 1896	18,858	11	15

Increase for month of March, 1896 2,134 17 4

As anticipated above, March return shows an increase of 2446 ounces over preceding month.

MINING IN DUTCH GUIANA.

By A. I. MATHER.

IN your issue of March 21 was a contribution from myself, on "The Gold Fields of Dutch Guiana." As capitalists of England are looking towards other countries than Australia for investments in gold mining, a few papers on this subject might be read to good advantage. Surinam, or Dutch Guiana, has a low flat sea coast of alluvial formation of some 225 miles in extent. As you approach it from the sea no hills or high lands are visible. The alluvial formation is caused by sediment deposited by the large rivers, running from the high gold hills in the interior of the colony, northwardly into the Atlantic Ocean. This alluvial formation is constantly increasing, and the approach from the sea is an ever changing system of bars and shallows. Heavy draft vessels are careful about running in shore after dark, preferring daylight and a local pilot, which last can always be obtained from the light ship anchored off the mouth of the Surinam River. The extent of the colony is nearly 60,000 square miles. Its capital is Paramaribo, which contains some 30,000 inhabitants. Paramaribo is the principal town of any note in the colony. It is some 10 miles inland on the western side of the Surinam River. It is a picturesque and quaint city, and its queer gables, tiled roofs, and open dykes make it extremely Dutch in appearance. One might fancy a portion of Holland had been chopped off and floated there. The population, like most tropical towns, is largely composed of negroes, coolies, Chinese, with a small percentage of white Dutch. A few Americans and English are established there. The sanitary conditions of Paramaribo are natural. It is built upon a shell formation. The soil is sandy and porous, and moisture from the heavy rains sinks into the loose soil, and is quickly evaporated by the sun. All drainage is on the surface, running into open dykes on all principal streets. The dykes run into the river and are closed with gates at their mouths. These gates open with the incoming tide and fill, and when the tide runs out to sea the refuse goes with it. This has much to do with the healthfulness of this colony, when compared with that of other tropical towns. For the past 10 years the death rate ranged from 2.43 to 3.80 in 100. An examination of the reports of the Medical Government Bureau will substantiate this. The other colonies adjoining Surinam are not so healthy. Nature seems to have done much for Surinam in the matter of health. Contagious diseases are comparatively unknown. A journey into the interior of some 40 to 60 miles shows a much higher elevation of land. There are only occasional settlements, some few cocoa plantations, villages of native Indians, and bush negroes. Tropical vegetation is so luxuriant, that it is with difficulty a landing can be made outside the plantations and villages, except where places have been cut out and kept clear of the tangle for such purposes. The auriferous belt is reached in about 75 miles due south from the sea coast. This belt runs through the colony in a north-east and south-west direction. It also extends through Cayenne, Demerara, and Venezuela. Its width, as far as has been discovered, is from 75 to 100 miles, and has as yet not half been prospected. Its geological formation is highly metamorphosed, consisting of porphyry, granite, schist, and obsidian. It belongs to the Silurian period. There is an abundance of iron conglomerate, with brown and red hematite. The reddish soil shows a composition of the detritus of iron and quartz. The country is mostly one tangled wild mass of verdure. The high mountains, of which there are many, are in nearly every instance covered with heavy timber growth, with occasionally an open savannah. Quartz is not so easily located as in open countries, as the extreme fertility of the soil buries, with its vegetable products, everything from sight under Nature's robe of green.

COAL IN ANGLESEY.—A vein of coal has been found in the parish of Llangristiolus, Anglesey, on land belonging to Mr. E. Roberts, Paradrws, and boring operations are being carried on with the view of testing its quality and finding the size of the vein. Coal was raised many years ago on land not very far from this place.

REVIEWS.

The Students' Lyell: a Manual of Elementary Geology. By John W. Judd. (London: John Murray, 1896.)

It is not often that two such names are seen together on the title page of a book, and when they are, the critics' office is almost a sinecure. As Professor Judd says in his preface, this volume is really Lyell's "Students' Elements of Geology" in a more modern dress. Not only was Lyell's work one of the very first treatises upon geology as it is now understood, so that its illustrious author had to contend with all the difficulties that beset the pioneer in any new field, but it is also considerably over half a century since the book was written. As the youngest of the sciences, geology is naturally the most progressive, and its teachings have undergone many and radical changes during that half century, more especially, perhaps, in the department of petrography, a science that may almost be said to have been non-existent when Lyell wrote. The principle which Lyell was amongst the first to recognise and work out—namely, that the mode of formation of the rocks composing the earth's crust can only be understood by studying the phenomena that we see taking place around us—is, however, as valid to-day as when it was first enunciated, and that has been rightly chosen by Professor Judd as the keynote of the present volume.

The classification of rocks is always a difficult matter, and the one here adopted by Professor Judd, though one of the most modern, as would naturally be expected from so advanced an exponent of geological science, is not free from objections. Instead of maintaining the old division into stratified rocks and igneous rocks as the basis of his classification, he divides them primarily into epigene rocks or rocks formed at the earth's surface, and hypogene rocks or rocks formed below the surface. This system, if carried out in all its integrity, would demand that one and the same rock mass might have to be classified in the one part as epigene, and in another as hypogene; this newer system is of immense value to the advanced geologist and petrographer, but it may be questioned whether it is as well adapted for the purposes of the student as was the older method which was used by Lyell.

For the mining engineer, physical geology is undoubtedly the most important branch of the subject, and this we find admirably treated of in the first section of Part II. on the aqueous rocks. The manner in which stratified rocks have been deposited, and the changes and alterations they have undergone since their deposition, are admirably described in clear and concise language; there is nothing wanting here, just as there is nothing superfluous, and the student who has thoroughly mastered the contents of these hundred pages will have laid the foundation for a sound understanding of all that geology has to teach him. The next portion of the subject is a review of the various geological systems, arranged in descending order; this is always a moot point as to whether geological formations should be studied by beginning with the most ancient or the most recent, but we ourselves incline, upon the whole, to the view that the order here adopted by Professor Judd is best adapted to the needs of the student.

Volcanic rocks are treated at great length, and in a most interesting fashion, their chronological relations being especially well brought out. The next part is devoted to plutonic rocks, and the next to metamorphic, a subject of especial interest to our readers—namely, the formation of ore deposits—being included in this latter. We cannot say that we consider this chapter equal to most of the others; it is rather too condensed, and not always as accurate as it might be. For instance, the sentence "the ironstones of Cleveland and the kupferschiefer of Thuringia have been produced during the consolidation and alteration of stratified deposits" can hardly be accepted as embodying the most modern views on the subject, for in both cases the metalliferous deposits are supposed to have been produced subsequently to the consolidation of the strata, the solid rocks having been acted upon by metal-bearing solutions which converted the one into ironstone, and deposited copper pyrites, &c., in the interstices of the other. Similarly with regard to the mineral veins, the views here set forth are the old theories that they are open fissures, within which various minerals have been deposited; the difficulty of supposing that a fissure 200 or 300 feet wide remained open long enough to become filled with mineral matter must surely have occurred to Professor Judd, whilst the cases which, as every miner knows, are very frequent in which veins have no well-defined walls, but pass gradually into the enclosing country rock, cannot be explained on this hypothesis. We should certainly have expected to find some reference to the views of modern workers on this subject—such as Vogt, Pospenny, Emmons, &c. We must add in fairness to Professor Judd that he concludes his chapter by pointing out that this branch of the subject is still in a very backward state, and that much remains to be done in it. It is curious that geologists in this country have almost to a man neglected the subject of ore deposits, and that we have done little in it since the days of De la Beche, so that it now remains very much where he left it. Of course, in a small book like this it would be impossible to enter into any great detail on one particular subject, and one which, after all, plays but a minor part in the science of geology, in spite of its great economic and practical importance.

Of the book, as a whole, we can only say that we know none better adapted to the needs of the student, and, we may add, of the mining engineer. We have ventured to criticise some of its weaker points, but these really do not detract from its great intrinsic value; neither do the few misprints we have observed in addition to those indicated by the author. Perhaps the most annoying is the misplacement of figure 700 on page 532. Professor Judd deserves the thanks of all students of geology for having thus modernised Lyell's immortal work, and having rendered it accessible to them in such an all-round admirable form.

Stock Exchange Investments. By W. H. S. Aubrey, L.L.D., (London: Simpkin, Marshall, Hamilton, Kent, and Co. Limited.)

This is a work which commends itself to us. It is written by the author of "The Rise and Growth of the English Nation," and is published at 5s. The title of the book explains its scope and treatment. Prefixed to the work is a useful analytical table of contents. Chapters headed "The Growth of Capital" and "How Money is Made" deal in an instructive manner with financial theories. They are also very interesting, as they embody facts and figures from the latest authorities to demonstrate how the wealth of the country is accumulating, and the necessity for safe and profitable channels for its use. Another chapter, entitled "The Border Line between Investment and Speculation," attempts to show how the one merges into the other. The history of Joint Stock and Limited Liability procedure is treated from the time of the South Sea Bubble, whilst old methods of the Protective Spirit are described from the days of the Plantagenets, with the perpetual interference with industry, trade, and personal liberty, and the futile endeavours to fix the prices of commodities, hours of work, rates of wages and interest, and the style of dress, as well as to pre-

scribe opinion and belief. The author has no sympathy with the attempts of modern officialism to establish a universal bureaucracy, before which individual choice and effort must bow. He is severe on the dilatory and costly process in bankruptcy and winding-up, and upon the octopus-like grasp of the Local Government Board and the Board of Trade. Stock Exchange methods, the usages of brokers and jobbers, the cover system, fortnightly and three-monthly settlement, modes of transferring stocks, inevitable fluctuations in market values, and cognate subjects are dealt with in various chapters, whilst Government Securities, Banks and Insurance Companies, Indian and Colonial Securities, Railways, Tramways, Mines, Corporation Stocks, Commercial Companies, American Ventures, and Foreign Stocks are specifically treated. An extensive Bibliographical List is supplied, with a recital of financial landmarks during the present century. Dr. Aubrey's book concludes with practical counsels and cautions on the Choice of Stocks, on Unreasonable Expectations, and on Hidden Pitfalls; and suggests certain Safe Rules, based upon wide experience and observation. A Glossary of phrases commonly used in Stock transactions and in Money Articles will be found useful. From what we have said it will be gathered that it is a very useful and valuable work.

A Federal South Africa. By Percy Alport Molteno, LL.B. (London: Sampson Low, Marston, and Co., Limited).

There is still no end to the books written on the great South African problem, and it is a difficult matter to remember, yet alone follow, the advice tendered us by self-constituted authorities. From the title of the book Mr. Molteno's design may easily be gathered, and as he supports his case with powerful and lucid arguments, his book is well worth reading, even though the reader may remain unconvinced after a study of them. That there are vague ideas of such an union cannot be denied, and the author's principal object has been to give a definition to them. He instances America as a menace to us of the dangers of disunion, whilst "the wonderful success of the machinery devised in 1787 for avoiding the inevitable results of a want of a central controlling authority will," he says, "give us confidence to proceed to a similar remedy for the growing dangers of disunion in South Africa." He attempts to assure us that the difficulties in South Africa are not so much racial as political, a statement which very few will be inclined to combat and as a proof of this he instances the fact that the two Dutch Republics have never succeeded in uniting together. But the statement which is likely to cause much astonishment and to withhold sympathy from the writer, is that wherein he says that the most powerful factor which makes for disunion at present is the interference of the British Government in the internal affairs of South Africa. "The result is," he says, "that while human nature remains what it is, the Republics will inevitably desire to have a champion to set against England," of which desire Germany has taken advantage. He considers it most important that English statesmen should realise this fact, and should refrain from interference in the internal concerns of South Africa. The design of the author's work is that a Federal Union be formed of all the colonies and states, and that England should step aside and allow the Federation to manage all its internal affairs. "Until this union is formed," he says, "it is not easy for England to withdraw, as it is desirable that it should do in its own interest, and in the interest of the peaceful and united development of South Africa." All that can be said is that the author's scheme is only one of many to which the late crisis has given rise, and that it is a solution which thousands, eminent and otherwise, are eager to see applied. But whether it is possible time alone can show. The book is ably written by a person who is competent to express an opinion and to give advice. We can, therefore, commend it to our readers, for they will not peruse it without gaining from its pages much instruction and entertainment.

Every Man's Own Lawyer. By a Barrister. (Crosby Lockwood and Co.)

This excellent little book, at the usual price of 6s. 8d., is again in our hands, with the statutes of general interest, including the Factory and Workshop Act, 1895, brought up to the present year. The cover bears the words of commendation which those who know this work are accustomed to see, "a complete epitome of the laws of England," "No more lawyer's bills," and so on. Our readers must take all this with the grain of salt. The work is by a barrister, and the willing reader who consults his work, turning to the careful and copious index, will find a reference to "puffing," and will find that to "puff" at auctions is illegal. The reader must not be perplexed. "Every man his own lawyer" is not sold at the auction-room, it is to be found only at every bookstall and stationers; for once it is transferred to the family library it becomes a book of ready reference, too useful to be parted with for the auctioneer's hammer. The barrister's "puff" may have conduced to the fact that it is finding its way into every household, and into the office of many a lawyer and business man. Yet this puff is not illegal. Its use shows the barrister's discrimination between that which is illegal and that which is not. A man is entitled to believe in the goods he has to sell. He is, moreover, entitled to praise them, and to appreciate their value, and if in doing this he uses words of high commendation and words which exceed even reasonable expectation, this is not illegal nor is it "puffing" his goods. Our readers who desire to discriminate further on the subject will, by turning to this work, for 6s. 8d. learn more. Those of our readers whose bookshelves are not already adorned by this work will do well to consult it, and, without expecting in consequence to avoid all lawyers' bills, will yet find it extremely useful, and that it supplies them with a vast amount of useful information carefully compiled.

TENDERS FOR COAL AND COKE FOR NORWAY.—The Board of Trade notify that the Secretary of State for Foreign Affairs has received a despatch from Her Majesty's Consul-General at Christiania, stating that the gasworks of Christiania have invited tenders for the supply of 25,000 tons of Old Pelton, New Pelton, Londonderry, Pelard Marin, Benwell, or Holmside gas coal for delivery during the next autumn and winter in Tyne Dock, Newcastle, at the following dates:—In August, 1500 tons; in September and October, 4500 tons; in November, 6000 tons; in December, 1896, and January, 1897, 7000 tons; in February to April, 1897, 6000 tons. Payment will be made per ton loaded, and will be effected in cash at the completed termination of each cargo. The conditions for delivery may be seen at the gasworks office, where tenders in sealed letters, marked "Anbud paa Kul," can be delivered before May 18 next. A further despatch has been received from Her Majesty's Consul-General at Christiania, stating that the Røros Copper Works have advertised for tenders for about 4000 tons best Mickleby coke and about 1000 tons coal (Beamish smalls or Stanley small), to be delivered between July 1 next and June 30, 1897. Further conditions may be obtained on application to the chief office of the copper works at Trondjem.

DUNLOP PNEUMATIC TYRE COMPANY (LIMITED).—First and second batches of letters of allotment and regret have been posted.

THE TOTAL GOLD EXTRACTION COMPANY, LIMITED.

(From *Le Crédit National*, Paris, May 7.)

THE works of this company are now in operation, and after the 10th instant permission will be given to visit them, as is stated in the letters of invitation to all the shareholders of the company.

Doubt is no longer possible. The Rigaud process will keep all its promises, and its industrial value has been proved; it is and remains above all contradictions and controversy. The Tancerville experiments have proved:—

1. That the Rigaud process extracts from gold ores the whole of the gold they contain.
2. That it lowers the cost of treatment from an average of 5 francs (4s.) to 60 centimes (6d.) per ton of ore treated.
3. That it reduces the time of the operation from three months to three days.

We might add that works which employ this process require an outlay greatly less than that necessary where the older methods are in use, but we prefer to waive this advantage in view of the enormous advantages derived from:

- The complete extraction of the gold.
- The low cost of the method.
- The saving in time.

In the present state of affairs, the regular and constant working of the Tancerville Works would alone suffice to earn a large revenue on the capital of the company.

This, however, is a secondary source of profits. The real profits, which will be enormous, will be gained by the company from:—

- The sale of patent rights.
- The sale of licenses.
- Treating ores and tailings on contract.
- Treating them on shares.
- Treating them directly.

In all these departments numerous agreements are being investigated, some of them being almost ready for final drafting and signature. At this very time French and English engineers, sent by the boards of various mining companies, and by a certain number of owners of tailings, are following the operations of the works. All these operations have been crowned with success, and all have answered to our expectations. The favourable reports that will result, supported by the feeling of satisfaction that the shareholders of the company will bring back from their visit to Tancerville, will necessarily create a current of opinion which will react happily upon the quotations of the Stock Exchange. It is easy to foresee that the price of 100 francs will be reached, and that within the first fortnight in June. This is the conviction of all financiers, all men of business, and all engineers who have been able to see for themselves the wonderful results obtained hitherto at the Tancerville Works.

From all sides the company is in receipt of offers. It has been requested to proceed to the Transvaal, to America, to Australia, to Russia, in order to construct trial plants after the pattern of the French one, and to treat on the spot the tailings which exist in considerable quantities in those countries.

It does not seem necessary to insist upon this extremely favourable position; we must, however, be allowed to point out how strictly accurate were our estimates of the practical and financial results that would be attained by the working of the Rigaud process, and which have now been verified and proved by actual facts.

We said that the company could fairly count, in its first year, upon an income of 40,000,000 francs, what with the transfer of patent rights and annual royalties.

The facts already established prove that we have made no mistake. But let us admit, if required, that unexpected delays may occur, and that only half of this result can be realised; this even would mean an annual dividend of 180 francs upon each one of its 110,000 shares, and a quotation of at least 2500 francs. Let us carry our prudential considerations to exaggeration, and reduce the first year's profit to one quarter of the amount we have predicted, we should still find the 25 franc shares receiving a dividend of 90 francs, and worth at the very least 1000 francs—40 times their par value.

These figures, even so far reduced, suffice for our showing. We leave them with confidence to the impartial examination of our readers.

CENTRAL AMERICAN INTERNATIONAL EXHIBITION.—The London Chamber of Commerce has been requested by the Under Secretary of State for Foreign Affairs (Mr. Curzon) to render such assistance as it possibly can in giving publicity to the Central American International Exhibition which is to be held in the capital of Guatemala from March 15 to July 15, 1897. Although it was decreed by the National Assembly that this should be a Central American Exhibition, still the Government are earnestly desirous for foreign nations to participate, and exhibits from any country will be admissible so far as they fall under: Science and letters; education; fine arts; mechanics and construction; agriculture, horticulture, arboriculture; special cultivation; fauna and floral, ornamentation; various industries; natural products; transport; mining and immigration. In a special despatch to the Foreign Office, British Consul Roberts reports that at the present time the quality of British goods finding their way to Central America compares favourably with other countries, except the United States, still it appears to him that the Exhibition might be made a means of yet further introducing British productions, if British merchants would support it. At the present time there is a great demand for machinery (for railway construction, coffee cultivation, sugar cultivation, &c.), and hardware of every description; improved appliances for dairy purposes; electric light and motive power plant, bicycles, &c.; all clothing materials, musical instruments, cutlery, jewellery, foodstuffs, fancy goods and articles *de luxe* generally. To encourage exhibitors their invoices of goods for display will be free of Consular fees, and the exhibits will be allowed to enter duty free—only becoming liable to duty when sold in the country, except in the case of articles gaining a prize which will be altogether exempt from duty even on sale. It would be necessary, in the Consul's opinion, for exhibitors to have some gentleman of good standing, well acquainted with commerce and the requirements of the country, to represent the English section, receive orders, and to act as intermediary between the exhibitors and the purchasing public, so as to build up a permanent increase in the use of English goods. Applications for space must be addressed to the Central Committee at Guatemala, before August 31 next, and detailed information in this connection, as well as the text of the general regulations, and of the Consul's despatch, may be seen on application at the London Chamber of Commerce, Eastcheap, E.C. between the hours of 10 a.m. and 5 p.m.

In accordance with the resolution passed at the annual general meeting of the ANGLO-FRENCH EXPLORATION COMPANY (LIMITED), held on Tuesday, that a final dividend at the rate of 7s. per share on all the ordinary shares of the company issued up to December 31, 1895, be paid, as also a dividend of £143 9s. 10d. in respect of each founder's share to December 31, 1895. The warrants of these dividends have been posted to the shareholders.

MEETINGS OF MINING COMPANIES.

DEVON GREAT CONSOLS COMPANY, LIMITED.

THE ordinary general meeting of the members of the Devon Great Consols Company (Limited), was held on Tuesday, at the offices of the company, 8, Finsbury Circus, Mr. PERCY WATSON, J.P., O.C. (Chairman and managing director) presiding. The SECRETARY (Mr. George Hadlee) read the notice convening the meeting.

The CHAIRMAN said: Before commencing my address I may state that I have got proxies and letters from several shareholders who express their regret that they are unable to attend. I suppose you will in the ordinary way take the report of the directors, and the various statement of accounts which have been duly audited, together with the report of the manager (Captain Clemo), as read. Well, I have not a great deal to say to you to-day, but you will observe in the directors' report that we call attention to the calamities which befall us some considerable time ago—about 12 or 18 months back. Unfortunately we have continued to experience mishaps with our fires and furnaces which have met with severe accidents from time to time, but which I am happy to say have in some measure been overcome. The fires have been rebuilt and the furnaces repaired, while the revolving calisher has also been attended to and put in good order again, after having run for many years. So far as our returns are concerned they have been materially interfered with by these unfortunate and unforeseen circumstances, but, of course, in arsenic works like these mishaps will occur. The weather affects the fires, a fact which those shareholders who have visited the mine can readily understand. In consequence of the frost, or snow, or rain, together with the enormous heat emitted from the fires, they from time to time fall down, and we have to rebuild them. Of course, it is a considerable drawback to us, but we must remember that other arsenical works have to encounter similar difficulties. It would, however, be much better if, years ago, they had been covered in, but we have been going on in the same way for many years, and I suppose shall continue on the old lines. However, we have encountered many difficulties which have taken not only time, but also money, and therefore I think, under all the circumstances, when we come to consider the reports laid before you, we may congratulate ourselves that things have not been a great deal worse. In regard to our accounts, we started last year with a balance in hand of £2012 5s. 1d., and declared a dividend, payable on May 28, 1895. When we come to consider what has taken place I say again, and I think the shareholders will agree with me, that we have done a great deal better than what at one time we anticipated we should. Some months our returns fell off very considerably indeed, and, as you will see by the report, we had to borrow £2000 from our bankers to tide over these difficulties. But this has, to some extent, been made up during the last few months, and we have been able to repay the loan of £2000, while we are also hoping to do a very great deal better during the next 12 months. So far as the mine is concerned, I think Captain Clemo and Mr. Bawden, both of whom are here, will tell you that it is looking very much better than it has done for some time. On the Watson part we have lately been getting some very good copper ore, and since the report was written, we have been informed of a further improvement in the very bottom level. This is a rather important discovery, and the only doubt that exists in regard to it is whether it will continue. It was made in the 172 fathom level, which is now driven 20 fathoms further east. Some good ore ground was found here, and is at present worth something like 4 to 5 tons of copper per fathom. The copper is of very good quality, and we hope to find it also in the 148 fathom level. I think Captain Clemo is rather inclined to drive the 148 level higher up, and if there is an improvement in the ore there it will be quite a new feature in this part of the mine. Watson's part of the mine was many years ago abandoned, but, on my recommendation, it was being re-worked, and, as you see by the report, it is looking very well. At places it produces 4, 6, and 7 tons per fathom of very good copper ore. We have here for your inspection specimens of the ore which were brought up on Friday last. Notwithstanding the improvement of the mine, the mishaps I have already alluded to have been a very serious blow to us. We are only just beginning to emerge from the difficulties encountered through the washing away of our bridge; and whilst on that point I might mention that Mr. Bawden, who represents that part of the district on the Cornwall County Council, has been in negotiation with that body on the matter. He has paid a good deal of attention to it, and I have also seen the Chairman of the Highway's Committee on the subject. Our views on the matter have been very favourably received. They have offered us a certain amount towards the cost of building a new one, but we hope they will double it at least from what Mr. Bawden tells us to-day. Then the County of Devon have agreed to give us £300, while I may mention that the Duke of Bedford, who knows the difficulties we have had to contend with as much almost as anyone else, he having been to see the place himself, to show his sympathy with us, has agreed to give £200. In addition, since the report was written I am pleased to tell you that His Grace has most kindly and generously given up half his royalty due to the end of February. (Applause.) I think he deserves our best thanks for his liberality, and I may take it, I think, that you appreciate his very kind act. In regard to the quantity of ore ground, and ore in reserve this has increased since the date of the report—both the copper, and the arsenic and mundie. In fact, the increase has been very recent, and, therefore, does not come into these accounts. But although there has been a new discovery made, it will take some months for us to be benefited by it. Captain Clemo will tell you that he had quite lately met with some very good arsenical mundie in several places, and he has brought us some of the richest specimens ever got from the mine. I do not think I have anything more to say, as the accounts before you are very full and explicit in themselves, although not so satisfactory as we may have anticipated some 12 months ago. But few can imagine the difficulties, common to old arsenical works, which we have had to contend with. However, I hope we may now look forward to much greater prosperity. (Hear, hear.) With regard to the price of the minerals, I may tell you that although we sold 69 tons of copper ore less during the last 12 months than we did in the preceding period there was an increase in the return of £843. We raised a much better quality of ore. In 1894 the price per ton was £1 10s. 3d., but last year it was £1 19s. 8d. We hope that that increase may continue. In the accounts you will see that we have written off £300 for depreciation. I see Mr. Freese, one of the auditors, is here, while Mr. Bait is also representative, and, therefore, if any gentleman wishes to ask any question with regard to the correctness of the accounts or anything appertaining thereto, I am sure they will be very pleased to answer them. So far as the price of the arsenic is concerned, in all probability it will continue to increase, but, of course, it is impossible to say definitely, in spite of the various demands there are for it. I do not want to frighten the ladies, but now-a-days colour seems to be everything, and it is said that some of our produce is used for this purpose. It is not for me to say whether it is a good thing to use or not for this purpose, but it is quite evident that there is a very good demand for arsenic at the present time. Whether it will continue it is impossible to say, but there are other outlets for it in various parts of the world, and, perhaps, it will not be well for me to say too much at present on the subject. At any rate, we hope that in the future we may have a better price for it. One other remark I will make in regard to the date of our accounts. We meet on May 19, and although this is one of the largest mining companies in the country we present accounts to you made up to April 30. At present some companies are only making up their accounts to the end of December, and some even go back to September last. Of course, the foreign companies do not

get their papers sent over to this country in such a short time as they would wish, but still I think you must be very pleased to have your accounts up to within 21 days of your meeting. (Hear, hear.) I now beg to move "That the report of the directors and the statement of accounts to April 30, submitted to this meeting, be and they are hereby received and adopted."

Mr. THOMAS GLEN seconded the resolution. Mr. SLOPER said he should be glad to know whether their works were now in order, while in regard to the proposed new bridge, was the company going to erect it and pay the difference between the cost and the amount of the subscriptions which were being raised for the purpose? Then, in regard to Watson's shaft, the Chairman made the remark that he hoped the ground in the 148 fathom level would turn out as valuable as that in the 172 fathom level. But they were not given the lengths of the drifts, and, therefore, did not know whether they really could expect the improvement to take place. Mr. Watson had said nothing about the reserves, and he would like to know the amount of ore there was in sight in the upper levels, which must come to an end some day. As to the price of arsenic, he understood that in New York it fetched £20 a ton, but they sold theirs for £13 and £14. Mr. SLOPER also adversely criticised the policy of allowing Mr. Peter Watson and Mr. Bawden to hold exactly the same positions in the Devon Gorton Copper Company as they did in the Devon Great Consols. He thought Mr. Watson should be prepared to reduce his fees in such times, while the directors should also forego a portion of theirs. Concluding, he asked the reason why the Chairman had reduced his holding in the company if he had any confidence in the mine.

The CHAIRMAN, in reply, said he, at present, held a larger interest in the company than he had done for 12 months past. With regard to his and the directors' remuneration, the arrangement was made in 1891, when the sum of £6500 was borrowed on the mine. Mr. Glen and himself made themselves personally responsible for the repayment of that loan, which had since been paid off, while besides they had paid the shareholders in dividends 13s. 6d. per share, or £6854 17s., making together £13,354 17s. He did not think, under those circumstances, that they could say the state of affairs was unsatisfactory. Mr. SLOPER would, however, continue, year after year, to bring forward unfair statements, especially the one in regard to his and Mr. Bawden's connection with the Devon Gorton Copper Company. However, he was in the minority, and they had the satisfaction of knowing that the large majority of the shareholders thought differently. But he had hoped the directors would have received his sympathy during the troublous times they had passed through. So far as his remuneration was concerned, he might say his very life was bound up with the concern. He held the largest interest, and his friends had a large interest in the company, and when he told them that although during the past two years the misdeeds had cost them the best part of £5000, they were only £1000 behind what they were last year, he thought the shareholders would appreciate the work he had undertaken and carried out. They had had most difficult times to contend with, and yet had come through better than they really anticipated. As to the distances of the drifts referred to by Mr. SLOPER, they were as follows:—The 148 level was driven 67 fathoms east of Watson's shaft; the 168 level 66 fathoms east, and the 172 level 86 fathoms east. Consequently the 172 level was 20 fathoms ahead, and was in whole ground right up to the 40 level. With regard to his and Mr. Bawden's connection with the Devon Gorton Copper Company, he was only sorry to think that Mr. SLOPER had no interest in the concern. All the shareholders in the Devon Great Consols had the option of taking shares in the Devon Gorton. He distinctly stated in the circular he issued to them when the company was formed that if the property could be purchased at the price named it would be greatly to their benefit to subscribe. Moreover, he pointed out another reason for their acquiring an interest in the Gorton Company. It was this—the Devon Great Consols and the Devon Gorton commanded something like 70 per cent. of the market in which they were interested. At one time it was suggested that the two companies should be amalgamated—(hear, hear)—but they found that under the Articles of Association and the position they held with regard to the Duke of Bedford that this was impossible. However, the result had been as he foretold, that the price of their arsenic had increased by £1 and £2 per ton. Dealing with the difference in the price of arsenic, Mr. Watson said the contract made by them had been running some time, while they also had to remember that the price mentioned by Mr. SLOPER was for smaller quantities and deliverable in America. One advantage of the Devon Great Consols and the Devon Gorton being managed by the same parties was that when they made a contract for one they also made one for the other, and so commanded the market. He would leave it to Mr. Bawden to speak about the new bridge. (Hear, hear.)

Mr. BAWDEN said: That before dealing with the subject of the new bridge he wished to remark, with regard to the connection of Mr. Watson and himself with the Devon Gorton, that if that was not the case most likely they would find the two concerns working in direct opposition to each other. (Hear, hear.) It had been his desire and his endeavour for many years to concentrate the arsenic business as much as possible. As to the price of arsenic, £20 a ton might be got for small quantities, but they could not get it for large supplies. With regard to the bridge, as they were aware, it was swept away in 1894, and it was considered that a bridge for carrying general traffic should now be erected. It would not be erected by the company, but they would only be asked to subscribe their share. The cost would be from £1000 to £1200, and already £800 had been promised. As the district had not yet been appealed to, he did not think the company would be asked to subscribe a very large amount. The works on the mine were, he considered, in very fair condition, but no doubt during the next six or twelve months they would be made much more efficient.

Captain CLEMO said he could endorse all that had been said by the Chairman and Mr. Bawden. It took them six months to get the water out of Watson's shaft and to put the mine in good order. The arsenic works were in good order, although, of course, the flues would fall down and must be rebuilt. They had discovered some good ground in Watson's shaft, and the mine looked very promising for the future.

The resolution was then put and carried unanimously. Mr. COPPEN moved the re-election of Mr. Francis George Lane, the retiring director, and said that gentleman was most assiduous in his attendance to the company's business.

Mr. BAYETT seconded the resolution, and it was carried. Mr. LANE, in reply, said, although during the past year they had not been so successful as previously, their prospects of better results in the future were excellent. They now looked more to the mine than to the surface for their returns, and during the past few months it had been proved to be very productive.

The CHAIRMAN proposed that the sum of 30 guineas be applied by the directors to the school for the miners' children.

Mr. LANE seconded the motion, and it was agreed to. Mr. SLOPER moved the reappointment of the auditors, Messrs. George J. Rait and Mr. Frederick W. Freese.

Mr. BAWDEN seconded the resolution, and it was carried. Mr. LANE proposed a vote of thanks to the purser (Mr. Bawden), the manager at the mines (Captain Clemo), and the staff. The anxiety they had experienced during the past two years had, he said, been almost more than a man could put up with.

Mr. A. TAYLOR seconded the vote, which was unanimously accorded.

Mr. BAWDEN, in responding, said it was by no means a pleasing task to be a manager of a poor mine. They had, however, been able to make a profit of £13,500 during the past five years—not at all a bad sum considering the circumstances under which they had worked the mine.

Captain CLEMO said during his 52 years' connection with the mine he had always tried to do his best, and should continue to do so.

Mr. JOHN COPPEN proposed a vote of thanks to the Chairman, the directors, and secretary, and said Mr. Peter Watson had put a very full statement before them. He had great confidence in him

and the mine, but they must not expect that it would work as smoothly as machinery. In regard to the directors' fees, he considered that in times of trouble and anxiety they should be increased instead of reduced. (Hear, hear.)

Mr. TAYLOR seconded the proposition, and it was carried unanimously.

The CHAIRMAN, in reply, said it was very satisfactory to find that they were unanimous in all their votes. He was glad the secretary was included, because Mr. Hadlee worked very hard, as there was a great deal for him to do. Again alluding to the directors' fees, he said he did not think they were paid a farthing too much for the work they did. He hoped during the next 12 months that their affairs would considerably improve. In conclusion, he wished to thank the large majority of shareholders who, though absent, had sent either proxies and kind communications.

The meeting then terminated.

CARN BREA AND TINCROFT.

Special meetings of shareholders in Carn Brea and Tincroft were held on Friday in last week, for the purpose of passing the resolutions necessary for the amalgamation.—Mr. F. HARVEY presided at both.

At Tincroft the PURSER (Mr. F. W. Dabb) intimated that proxies for 5029 shares had been received.

The CHAIRMAN was satisfied they were on the road to success with regard to the amalgamation, and it would be the best thing that could happen to that mine and the neighbourhood. The committee had been able to arrange with the lords as to the rate of dues to be paid and the terms promised were—1-50th with tin under £40, 1-40th with tin between £40 and £55, 1-26th with tin between £55 and £65, and 1-20th when tin was above £65. There was also a promise of the remission of all dues for three years, unless profits were made or dividends declared. He proposed a resolution appointing Mr. F. W. Dabb the liquidator of the old company.

Mr. C. MASON seconded the motion, which was carried.

Resolutions were also carried, authorising the liquidator to consent to the registration of a new company, to be named "Carn Brea and Tincroft Mines (Limited)," with a Memorandum and Articles of Association, which have been already prepared with the privity and approval of the directors, and approving of the draft agreement.

Mr. J. MAYNE: What is qualification for directors?

Mr. C. V. THOMAS: The first directors are the members of the two committees, and they continue in office until the first statutory meeting, which must be held within four months of the registration of the company, so that in less than four months time the election of directors will be in the hands of the shareholders. The qualification is put down at £500.

Captain W. TEAGUE, in supplementing a report of the mine, said the water at North Tincroft was rising about 3 feet in 24 hours, but they could go on for a considerable time yet without any interference with their returns. They had holed from the 120 to the 100 fathom level, which would lay open a large section of highly mineralised ground quite equal to any they had had for some time, and would enable them to keep up their returns until the water went back. In the Cook's Kitchen part they had had a serious run of ground to contend with, but that had now been secured. The water was now at the 160, and they hoped to be able to work the engine there in four weeks' time. From what he knew of the lode in the 315 and the 320, there was reason to believe that there was a very valuable lot of unexplored ground in that direction yet to be taken away. (Hear, hear.)

In reply to Mr. MASON, Captain TEAGUE said the water in the North Tincroft part was now up to the 140.

At Carn Brea meeting the PURSER (Mr. John Trevethan) reported that proxies for 4394 shares had been received in support of the scheme.

The CHAIRMAN said he had omitted to mention at the other meeting that the new lease would be for 60 years. Similar resolutions to those passed at Tincroft were unanimously adopted.

Captain W. T. WHITE, the manager, said Harvey's engine shaft was sinking below the 334, and was now down about 11 fathoms, and from the appearance of the ground it was evidently getting into a more settled kind of ground they had seen above. They contemplated sinking another 2 fathoms, and then driving south to cut the south part of the lode. They had gone through a lode 17 feet wide, and were now opening on it, and they had very strong hopes that as they neared the Poddler's crosscourse, which was not very far, they would have a highly productive lode. (Hear, hear.) In the driving of the 322 east they had met with a leader of tin worth 2 cwt. to the ton—(hear, hear)—and they attached the greatest importance to that improvement.

LEVANT MINE.

A 16-weekly meeting was held on the mine, on Tuesday, Major White presiding.—The accounts for the four months ending April 4 showed labour cost, £8123 2s. 10d.; merchants' bills, £2634 14s. 11d.; coals ex-ship board, £758; rents, &c., and interest brought the total expenditure up to £11,817 9s. 9d. The receipts included 127 tons 6 cwt. of tin sold to the Consolidated Tin Smelting Company, £4727 6s. 3d. (less £95 lord's dues); copper ore sold during February and April, 1432 tons 16 cwt., £6129 16s. (less lord's dues, £148 2s. 9d.); arsenic sold, balance £409 19s. 11d. (less dues £28); the total receipts being £11,498 15s. 4d., showing a loss of £318 14s. 5d. There was a balance against the adventurers on the last account of £449 10s. 10d., which makes a total now against the adventurers of £768 5s. 3d.—The agents reported that they were rising in the back of the 278 level east of the submarine shaft on the north lode by boring machinery to prove the eastern ground. The rise was producing a little tin and copper, rising at £7 10s. They were also driving a crosscut at this level by boring machinery to cut the south lode east of the submarine shaft at £8 per fathom. They had driven in ends 120 fathoms 1 foot 3 inches for the past 16 weeks, and were now driving 12 ends by 43 men and five boys, and they had 169 men and 27 boys working in stopes, winzes, and rises; total employed in every department underground 343 men and 165 boys. The prospects for the coming four months indicated that there might be a slight falling off in copper. On the whole, they hoped to raise about the same quantity of mineral as in the past.—The accounts were passed.—Mr. Doidge proposed, and Captain Oats seconded, that Messrs. Oats, Richard Thomas, William Thomas, T. Bolitho and Sons, and Major White should form a committee of management, and the motion was carried.—Captain Oats proposed that the member for the division (Mr. T. B. Bolitho) use his influence with the Government to secure the same favourable consideration for depressed mining, by reduction of the rates, as agriculture was to receive by the Rating Bill.—Mr. Davy seconded, and it was carried unanimously.—Mr. A. Berryman intimated that the present was the last time he should meet the shareholders as the agent of the lords, because he had been hampered in his work, and could not continue under such circumstances. Although he had often written to Mr. Cumberland, the lord's solicitor, with reference to the grant for the submarine working, he could get no reply, and the silence was inexplicable to him. He agreed with Mr. Bolitho, the mine solicitor, that it would be unwise to proceed with the inland sett until the question of the submarine sett was decided, and that matter now rested entirely with Mr. Cumberland.—Captain Oats said it was most desirable to have something more definite for the protection of the shareholders, as they had been losing money in the mine. It appeared to him that the lords were standing in their own light, as their action would prevent people who might be disposed to adventure in the mine from doing so.—Mr. Berryman explained that the lords were really not responsible.

ANGLO-FRENCH EXPLORATION COMPANY (LIMITED).

The ordinary general meeting of the shareholders in the Anglo-French Exploration Company (Limited) was held on Tuesday, at Winchester House, E.C., Mr. E. G. Mocatta presiding.—The Chair-

man, in moving the adoption of the report, remarked that the figures in the accounts were eminently satisfactory. At December 31 last their investments stood in their books at £395,000, but they were worth a good deal more. In addition, they had cash and cash assets, which, after deducting their liabilities, amounted to £450,000. The ordinary working expenses, from which he excluded the commissions of the managing directors, came to about £21,000, and their interest account and agency fees covered this amount almost exactly. After writing off £17,101 for ascertained losses and depreciation, the profit and loss account showed a credit balance of £493,444. The sum of £86,999 derived from premiums received from the sale of part of the reserve shares had been carried to a reserve fund, and the money was being employed in the ordinary business of the company. An interim dividend of 3s. per share was paid last September on all the ordinary shares then issued, and the board now recommended a final dividend for 1895 of 7s. per share, equivalent to a total distribution of 50 per cent. for the year. This distribution would entitle the founders' shares to a payment of £143 9s. 10d. per share, and would leave to be carried forward £263,477. Their investments amounted to £720,000, which sum, together with their cash or its equivalent, exceeded their paid-up capital and liabilities by about £826,000. Referring to the political troubles in the Transvaal, he expressed regret that angry feeling had been aroused between the two races who had to live and work together in South Africa, and said that for the restoration of confidence, patience, and forbearance were required, with as little discussion as possible of burning questions. It was only due to Mr. George Farrar (managing director) to say that although he took an active part in connection with the Reform Committee he was careful not to associate this company, or any one identified with it, in any way whatever with his action.—M. L. Ochs seconded the resolution, and it was carried.—Subsequently an extraordinary general meeting was held, when the following resolution was agreed to:—"That the Articles of Association of the company be altered by substituting the following article for Article 78, namely:—"The directors shall be paid out of the funds of the company, by way of remuneration for their services in each year, a sum calculated at the rate of £250 for each director, in addition a sum equal to 5 per cent. of the amount of profits distributed by way of dividend or bonus for any year after payment of a cumulative dividend at the rate of 8 per cent. per annum on the ordinary capital of the company for the time being paid up. All remuneration shall be divided among the directors in such proportion and manner as they may determine, and in default of such determination equally."

SAN JORGE NITRATE COMPANY (LIMITED).

The seventh annual general meeting of the shareholders in the San Jorge Nitrate Company (Limited) was held on Monday, at Winchester House, E.C., when the Chairman (Mr. Robert Harvey), in moving the adoption of the report and accounts, in which a final dividend of 7s. 6d. per share was recommended, said, although the profit for the year was £54,000, it was only equal to 15½ per cent. on the capital. Compared with 1890, when the conditions of the nitrate market were almost similar, there was a considerable decrease in 1895, and this in spite of the fact that the output last year was the larger of the two. But the reason for this was they had been working ground which had already been partly worked, and thus lengthened the life of their oficina. The combination for the restriction of the output was, he was pleased to say, working very satisfactory, but what was now required was a combination also in the sale of the nitrate. The present competition in the market was responsible for a loss of £1 per ton. The present price was £8, but he was quite sure that they would find as many purchasers if it was £9. In regard to the prospective duration of the company's grounds, their manager reported that he was of opinion that he could easily work San Jorge for a period of 25 years longer. During the past seven years the shareholders had received 102½ per cent. in dividends, and he had no hesitation in saying that they would receive a similar sum in the next seven years.—Mr. G. M. Inglis seconded the resolution, and it was carried.—The retiring directors, Messrs. Jose Zayas and G. M. Inglis, were re-elected, as also were the auditors, Messrs. Price, Waterhouse, and Co., and the meeting concluded with a vote of thanks to the Chairman.

GOLDEN GATE OF CALIFORNIA (LIMITED).

An extraordinary general meeting of the shareholders in the Golden Gate of California (Limited) was held on Wednesday, at Winchester House, E.C., Mr. W. Ashton-Ellis presiding, for the purpose of considering resolutions for the reconstruction of the company.—The Chairman, in moving the resolutions, stated that it was very encouraging to the directors, after having experienced such troublous times, to find that they had a very rich property in the Rock River Mines, for which they required additional capital to complete the purchase. On Monday they received the following cable from their consulting engineer (Mr. J. B. Low), and the general manager (Mr. G. H. Evans):—"The character of the ore we expect to strike will be so remarkably rich that it will be most advantageous for shipment. Mill will not be required. Ore will be carefully assorted by hand when prepared for shipment to San Francisco. In our present position it will be best to be all ready to complete the purchase July 1. In the meantime you must push on the developments." The capital of the new company would be £80,000 in 80,000 £1 shares credited with 17s. paid up; 1s. would be paid on application, and 6d. on allotment, and the balance as and when required. However, it was not anticipated that the balance would be wanted.—Mr. Pechey seconded the resolutions, and they were carried unanimously.—A vote of thanks to the Chairman and directors concluded the meeting.

LOMA GOLD MINES (LIMITED).

A meeting of the shareholders in the Loma Gold Mines (Limited) took place at Winchester House, E.C., on Tuesday, having been called by Mr. G. P. Ernest, through whose instrumentality the original reconstruction scheme recommended by the directors was recently rejected.—Mr. Ernest first explained how it was that he came to know so much about the Loma Mines. As Chairman of the Biretto Syndicate, whose property was adjoining, he had from time to time received full information with regard to the prospects of the Loma Mines. Neither of the reports of the two engineers, Mr. Oakes and Mr. Russell, who had visited the property, were of a satisfactory nature, and yet the directors had the audacity to ask the shareholders to agree to a reconstruction scheme, and subscribe additional capital. Finding that some of the shareholders thought a call of 1s. 6d. was too much, the board now proposed to only ask for one of 6d., but even this amount, he contended, would be absolutely thrown away. He also maintained that the property would never return a profit while the present board were in office, and announced that he had taken the necessary steps to remove all of the directors from the company. He proposed—"That the proposal being submitted by the directors as to reconstructing the company with a call of 6d. per share is, in the opinion of this meeting, useless, and would only mean another reconstruction in a very short time."—The resolution was carried, and subsequently a committee was appointed to consult with Mr. Russell and Mr. Oakes as to what would be best to do in the interests of the company. In the event of the committee not considering their report satisfactory, an absolutely independent engineer was to be called in.—A motion was also agreed to urging the desirability of replacing the present directors with an independent board.—The meeting concluded with a vote of thank to Mr. Ernest.

COOLGARDIE GOLD FIELDS DEVELOPMENT CORPORATION (LIMITED).

The statutory meeting of the shareholders in the Coolgardie Gold Fields Development Corporation (Limited) was held at the Westminster Palace Hotel, on Wednesday, when Mr. E. Hyacinth, who presided, said the most pleasant duty devolved on him to announce that so successful had their operations been that they were able already to declare a dividend of 100 per cent. The profits would admit of even a larger distribution, but it had been considered advisable to open a reserve fund and to carry forward the balance for the purpose of extending the business of the company. The late-

news they had received from their manager at Coolgardie was very encouraging, and there could be no doubt but that the shareholders had a great future before them. A proposal had been made by a strong financial group in London to take over the company's assets and business as a going concern, and the board, having such a high opinion of the merits of the different properties, had made a point in the terms of insisting upon the shareholders having the right to apply for and have allotted to them at par at least one-third of the shares to be offered to the public in any company formed to take over the business.—A vote of thanks to the Chairman terminated the proceedings.

LONDON AND SOUTH AFRICAN EXPLORATION COMPANY, LIMITED.

The annual general meeting of the shareholders in the London and South African Exploration Company (Limited) was held on Thursday at Winchester House, E.C., Mr. C. J. Posno (the Chairman of the company) presiding.

The SECRETARY (Mr. George Brown) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—The observations I shall make on the present occasion will be few but sweet. The gross revenue for the year amounts to £104,047, as compared with £75,790 in the previous year, while we have distributed £70,000 in cash in the year under review, as against £55,000 in 1894. But that is not all, for at the end of 1894 we had cash and bills in hand sufficient to pay a dividend, whereas in the year under review we have not only paid £15,000 more than we did in the previous year in dividends, but we have a balance in hand of £20,000 in excess of the debts to be discharged. Those figures will suffice to show you our improved position, and also prove to you that our financial position is stronger than it has ever been. (Applause.) We have had to do without certain collections in the past which have come in during the year under review, and which, no doubt, accounts, to some extent, for the increase. The North-Eastern Bultfontein Company has been in liquidation for some two years, and it was during the year 1895 that the distribution of the liquidation account was made, and we received our proportion. Besides this, another satisfactory feature has arisen—namely, that there is now an active sum of rent, amounting in round figures to £12,000 per annum, which amount in previous years was merely a book entry, being an amount debited to a company in liquidation. It did not bring in any revenue, and it was simply the continuation of a debit entry. In addition to this yearly rental, which has amounted to £12,078, from the 371 claims, which were formerly the property of the North-Eastern Bultfontein Company, we have let other land, mostly for the accommodation of our new tenants, at a yearly rental of about £1250. One of our tenants, I regret to say, the holder of 30 claims, has not fared well, inasmuch as he has reported that the claims have cut out, and are unproductive. Very little has been done in debris washing; it was limited to leased or licensed stands, and produced £655. The revenue account for the year, which is made up at our Kimberley office, is as follows: Mining produced £94,296, land £30,283, miscellaneous £2391. The mining in 1893 produced £47,237, in 1894 it produced £51,051, while, in 1895, as I have stated, it produced £94,296. The land receipts in 1893 were £32,948, in 1894 they were £27,536, and in 1895 £30,283. Therefore, practically, the income from land has not varied, or only very little. It has slightly varied in our favour, but the principal increase is under the head of mining. The report makes the gross revenue on final adjustment £105,740. The exchange on the remittances is slightly in our favour, and that gave us an advantage of £542, making the total £106,283. From this the accountant in South Africa has deducted expenditure £14,225, leaving what is called a gross revenue of £92,000. From that he deducts £11,690, in what appears to Mr. Curry a somewhat arbitrary way, for decreased surface rents, reserves of rents, and bad debts, leaving the net revenue at £80,367. This, however, Mr. Curry says, is simply a matter of account, and in view of the fact that the remittances during the year have been £105,500, it is not very alarming. Then in the year under review there is a small increase shown in the amount of the expenditure over that of 1894. That increase is £767, but it is in part accounted for by the commission on the remittances, which is 1 per cent., being £438 larger than on the remittances in previous years, when the remittances were so much smaller. That leaves £329 to be accounted for, which was caused by necessary repairs at the offices and the outside painting of the lodge after nearly seven years' wear. In the matter of rates, we have been able to obtain a small reduction, and that has also helped us a bit. It is not very important, but still it is a step in the right direction. Then about the maintenance and improvement—the estate has been maintained and the fencing has been extended, and, therefore, improved. Under that head I find that the fencing of the boundary line between the company's farm of Alexanderfontein and Spytfontein was undertaken in the latter part of the year, and the company's half finished, but Mr. Kotze, the owner of Spytfontein, has not completed his erection. It is not necessary to fence the estate, but it is compulsory by law. There was also a little trouble about the burweed, and the work of eradicating it has been carried out. Then it has been a bad season for fruit and other matters that we all know. I would like to mention before I sit down that I would apologise for the absence of our co-director, Mr. Harry Lawson. He is with the yeomanry, and as he could not possibly be here, he asked me to apologise for his absence. I may say that he went out to South Africa at the end of last year, and devoted a great deal of attention to the company's interests. We owe him a debt of gratitude for the attention he has given to our affairs, and I may add that he has helped, to a very considerable extent, the development that was then taking place, and which, I am happy to say, is continuing. (Applause.) I shall be very pleased to answer any questions that shareholders may desire to ask, and will now formally move: "That the report and accounts, as presented, be and are hereby adopted." (Applause.)

Alderman FAUDEL-PHILLIPS seconded the resolution, which was carried unanimously.

Mr. Louis Schott and Alderman Fandel-Phillips, the retiring directors, were re-elected.

Alderman FAUDEL-PHILLIPS, in reply, said that he had only been a member of the board for a short time, but in that period the business of the company had materially increased. When he joined the company he bought 200 shares, and received a dividend of 9½, which were now worth 14½, showing the greatly improved position of the company. It was pleasant, therefore, to belong to an undertaking which was so successful. (Applause.)

Mr. HENRIQUES proposed that a cordial vote of thanks should be given to the staff, not omitting their able and courteous secretary, Mr. Brown. (Applause.)

Mr. LOUIS FLORENHEIM seconded the motion, and it was carried unanimously.

Mr. GEORGE BROWN said: I thank you very much, on the part of myself and my colleagues, and I am sure your compliment will be very pleasant reading in South Africa. With regard to the London staff under my own immediate supervision, I can only say that your compliments are deserved. (Applause.) As to myself personally, this is a special occasion, and I wish to point out to you that this is the jubilee meeting of the company. (Applause.) I have been connected, like the Chairman and some of the directors, with the company since its formation at the end of 1870, when it was incorporated with a capital of £20,000, now increased to £60,000. During the earlier period the company had its troubles, and it was a little pinched, but during these 25 years I have had the honour and the pleasure of distributing in dividend to the shareholders no less a sum than £1,145,900, upon a capital of £50,000. (Applause.) I therefore hope I shall not be accused of undue egotism if I say that I do feel a certain amount of pride in having for 25 years assisted in the

navigation of a company which had paid so large dividend. (Applause.)

The auditors—Messrs. Mardon, Mosley, and Co.—were then re-appointed.

Mr. STEVENS proposed a vote of thanks to the Chairman and directors, with special reference also to Mr. Lawson, who had visited the property at his own expense. (Applause.)

Mr. SAMUEL seconded the motion, which was carried, and the meeting then terminated.

KIMBERLEY DIAMOND MINING COMPANY, LIMITED.

The annual general meeting of the shareholders in the Kimberley Diamond Mining Company (Limited) was held at Winchester House, E.C., on Thursday, Mr. C. J. Posno presiding.

The SECRETARY (Mr. Geo. Brown) read the notice convening the meeting.

The CHAIRMAN said under the agreement with the London and South African Exploration Company, they had received during the past year the sum of £14,800. The expenditure on the concession had now practically ceased with one exception, and that was the new venture which they had entered into, for which they had undertaken to find a sum of money not exceeding £5000. That sum had been raised, as they all knew, by the making of a call of 2s. per share. He was not in a position to tell them that day whether the venture would be profitable or otherwise, but so far as they had gone they were led to believe that of the £5000 only one half would be expended on the concern. They had shared very considerably in the success of the London and South African Exploration Company. They were the pioneers who led to the further discoveries, and afterwards the Exploration Company collected the rent. Of the £14,800 which they had received, the directors had already distributed an interim dividend of 2s. per share, and it remained for the shareholders to say what should be done with the remaining balance of £4934. In regard to the future prospects of the company, he might explain that they were certain of a sufficient income to at least pay the current expenditure. He then moved the adoption of the report and accounts.

Mr. WEBB seconded the motion, and it was agreed to.

The CHAIRMAN next moved that the sum of £300 be paid the company's manager in South Africa, Mr. Curry, this being a commission of 2 per cent. on the net profits earned during the last three years. He explained that the proposal was made in consequence of the very small salary paid to Mr. Curry.

The resolution was agreed to.

Mr. L. Schott was re-elected a director, and Messrs. Deloitte, Dever, Griffiths, and Co., auditors.

Some discussion took place with reference to the disposal of the balance of £4934, and it was eventually resolved to distribute the amount by way of a further dividend.

A vote of thanks to the Chairman concluded the meeting.

LONDON AND WESTERN AUSTRALIAN SYNDICATE (LIMITED).

The second ordinary general meeting of the shareholders in the London and Western Australian Syndicate (Limited) was held on Monday, at the offices of the company, 8, Old Jewry, E.C., when Mr. H. C. Parkes, who presided, in moving the adoption of the report and balance-sheet, said the whole of the shares held by the company were standing at a premium on the exchange. The resolution was carried, and the sum of 250 guineas was voted in respect of the secretary's salary and staff and office expenses. Mr. H. C. Parkes was re-elected a director, and Messrs. Hart Brothers, Tibbets and Co., auditors.—Subsequently an extraordinary meeting was held for the purpose of considering resolutions for the reconstruction of the company.—The Chairman, in moving the necessary resolutions, explained that the first transaction of the company practically swallowed up the whole capital. It had also been thought desirable to do away with the £50 shares, and under the new scheme the shares would be valued at £1 each. Every shareholder who now held one £50 share, 200 shares, for which he would pay £40, while each deferred shareholder would get 30 shares, for which the holder would pay £5. Those would absorb 35,000 shares, and would leave 65,000 in reserve.—Mr. Leverton seconded the resolutions, and they were unanimously carried.—A vote of thanks to the Chairman terminated the proceedings.

BARRETT GOLD MINING COMPANY (LIMITED).

The annual general meeting of the shareholders in the Barrett Gold Mining Company (Limited) took place at Winchester House, E.C., on Thursday, Mr. John S. Prince presiding.—In moving the adoption of the report and accounts, the Chairman said the small balance of £613 made during the year 1894-5 had been increased to £1345 during last year. The new tram line to connect the various workings with the mill and cyanide works had been completed, and they were now in a position to run down more ore than they could deal with. During last October 800 ounces of gold were obtained from 1600 tons. The same result was obtained in November as well, and they saw no reason why equally good returns should not continue to be made. An important alteration at the works was that by which they were able to treat the ore direct by cyanide instead of previously milling it as heretofore. Consequently, the mill had been used but very little during recent months. The prospecting work which had been carried on had led to the discovery of bodies of gold-bearing ore; but further work was necessary in order to prove the value of the finds. In regard to the 22,000 tons of slimes averaging 10 dwts., their manager was closely watching the progress of the works of the Robinson Mine, erected by the Ore Reduction Company, and was hopeful that by the experience he would thus obtain to be able to treat this successfully. Altogether the prospects of the company were most encouraging.—Mr. Flack seconded the resolution, and it was carried.—Mr. John S. Prince, the retiring director, was re-elected, as also were the auditors, Messrs. Wm. Westcott and Co., and the meeting concluded with a vote of thanks to the Chairman and directors.

ALL NATIONS GOLD MINES (LIMITED).

The statutory meeting of shareholders in the All Nations Gold Mines (Limited) was held on Thursday, at Winchester House, E.C.—Mr. Samuel de Lissa, who presided, said the company was formed with a capital of £100,000, and a working capital of £15,000, all of which was fully subscribed, and was practically intact at the present moment. There were also some £15,000 worth of shares in reserve for future issue. The All Nations leases were reported on very favourably, especially by Mr. Arthur Austin. Another valuable report had been furnished by Mr. W. H. Angrove, who was a man of great experience. The well known expert, Mr. Fearby, in the course of a report, said:—I estimate that you have from No. 1 to No. 3 shafts 466 feet in length, and at the shafts at present sunk average 53 feet, and the width of reef 4 feet, you have already 11,700 tons of ore now in sight, and this I estimate will go all through 2 ounces to the ton. I am of opinion that there will be richer sheets of gold got in this mine when it is further developed, for I have not seen a better looking reef in any part of the West Australian gold fields. You have what I consider a true fissure reef, and one that will live down to a great depth. The Chairman, in conclusion, remarked that the mines were fully justifying the expectations formed of them, and he hoped that at the next meeting there would be something substantial to give the shareholders in the way of dividends.—The proceedings then terminated.

DOMINION GOLD MINING AND REDUCTION COMPANY (LIMITED).

A special meeting of the priority shareholders in the Dominion Gold Mining and Reduction Company (Limited) was held at the offices of the company, No. 20, Bucklebury, W.C., on Thursday, for the purpose of confirming the resolutions passed at a previous meeting, by which the priority shares are abandoned and become

ordinary shares, and the capital of the company increased to £200,000 shares of £1 each.—The Chairman formally moved the confirmation of the resolutions, and the motion was unanimously agreed to.—Subsequently, an extraordinary general meeting of the ordinary shareholders was held, when a similar resolution in regard to the increase of the capital of the company was also unanimously confirmed.

VICTORIA REEF GOLD MINES (LIMITED).

The statutory meeting of the shareholders in the Victoria Reef Gold Mine (Limited) was held on Wednesday, at the offices of the company, No. 72, Bishopsgate-street, when the Chairman (Mr. J. Blackwood) stated that another reef had been found on the company's property, and was supposed to be of a very rich character. One feature about the property which was encouraging was this—the underlay or dip of the reef first found ran parallel with the new body of ore discovered for some considerable length, and then suddenly met it, and it was well known that where two reefs come into contact with each other the deposit at the particular spot was generally very auriferous. In regard to machinery, the directors had decided to start with only 10 stamps; and they had purchased the mill in Australia, and it was now on its way to Fremantle. It was expected that they would be able to crush 30 tons a day, and, therefore, if they could get at least half the assay value out of their stone the production would be 60 ounces of gold per day. Calculating their mill to be running for 300 days in the year, the return would be 18,000 ounces, and would yield £70,000. Speaking of the prospective life of the mines in West Australia generally, Mr. Blackwood quoted various authorities to prove that the mines were of a lasting character, and were likely to return a profit for a great number of years. The meeting concluded with a vote of thanks to the Chairman and directors.

GOLCONDA GOLD MINES (LIMITED).

The statutory meeting of the shareholders in the Golconda Gold Mines (Limited) was held on Thursday, at Winchester House, E.C., Mr. R. J. Price, M.P., being in the chair.—The Chairman stated that the reconstruction of the company had met with the greatest success; 85,000 £1 shares credited with 15s. paid were issued, and 84,000 were taken up by the members. They called up 1s. 3d. per share, and £1750 of the amount realised had been remitted to the mine. The recent crushings had been very satisfactory, the average return having been 2 ounces per ton. From December 21 to February 23 they crushed 365 tons, which yielded 655 ounces, while from February 29 to April 30 490 tons were crushed with a yield of 1100 ounces, valued at £4400. The vendors of the property had now been entirely paid off, and there was a balance in favour of the company of £2774. The necessary machinery to work the mine on a large scale, for the purchase of which the additional capital had been required, was now being obtained, and in September or October next they ought to have regular crushings taking place, together with further development of the property. The latest news they had from the mine was as follows:—"Reef No. 2 north winze, 75 feet level, now 4 feet 6 inches"—(It has widened out to that from having been only 2 feet)—"turning north-east. As the breast of the level is advanced the ore is becoming richer, showing visible free gold. In the north and 75 feet high grade ore body still continues, and going down. Mine is looking well, and promises better. Vendors paid. The railway is now open 53 miles from Mullwa."—Several questions having been asked and answered, the meeting terminated.

SANTA RITA NITRATE COMPANY (LIMITED).

The seventh annual general meeting of the shareholders in the Santa Rita Nitrate Company (Limited) was held at Winchester House, E.C., on Thursday, when Mr. Henry W. Lowe, who presided, in moving the adoption of the report and accounts, said, as the result of the year's working, they had a credit balance amounting to £8099, which, with the amount brought forward, represented a total of £15,176. Out of this a dividend at the rate of 10 per cent. would be declared, leaving a balance of £5546 to be carried forward. The production for last year was 15,000 tons, or an increase of nearly 2000 tons on the preceding 12 months. The nitrate combination would secure for them, for some few years at least, a profitable price for the article, while the acquisition of the new grounds of Carolina was a very satisfactory matter. In order to provide for the purchase of the property, £35,000 was issued in debenture stock. In addition, large deposits of caliche had been found to exist on the Santa Rita grounds, and it was estimated that the oficina was still good for another 10,000,000 quintals of nitrate. A further point in the company's favour was that the railway carriage fees from Carolina were less than those from Santa Rita. Taking all things into consideration, he thought they might fairly expect a vast improvement in their profits in the future.—The resolution was carried, Mr. H. W. Lowe was re-elected a director, Messrs. Price, Waterhouse, and Co. as auditors, and the meeting concluded with a vote of thanks to the Chairman.

WEST AUSTRALIA PROPRIETARY CEMENT LEASES (LIMITED).

The statutory meeting of the shareholders in the West Australia Proprietary Cement Leases (Limited) took place at the offices of the company, No. 3, Princes-street, E.C., on Tuesday, Mr. W. H. Lowe presiding.—The Chairman said up to the present only £10,000 out of the £50,000 set aside for working capital had been called up. Their properties consisted of about 520 acres of cement-bearing ground in the 25 mile district and at White Feather. So far as they had proceeded with the development work, the results had been wonderfully encouraging. Of course their business was merely to develop the property enough to warrant the formation of subsidiary companies, and they had disposed of about 1-10th of their ground already. The Sugarloaf 25 Mile Cement Leases (Limited) had purchased 54 acres at the Kintore group for £100,000, payable £40,000 in cash and £60,000 in shares. The cash had been received, but the shares were locked up until the proper time came for their realisation. The directors also believed that they would be able to successfully float a company for the purpose of acquiring the White Feather portion of the property. The water question had been satisfactorily settled, and at present they were considering what process should be adopted for the working of the cement.—A vote of thanks to the Chairman terminated the meeting.

MAUNDER MACVEAN SYNDICATE (LIMITED).

The first ordinary or statutory meeting of the shareholders in the Maunier Macvean Syndicate (Limited) was held on Thursday, at the Company's office, Broad-street House, E.C., when Mr. J. R. W. Maunier, who presided, stated that they had acquired a very valuable option in West Australia on most favourable terms, and one of the directors, Mr. Donald Macvean, was now on his way to Coolgardie to inspect it before the purchase was completed. They had also secured the option of a gold mine, to work which a subsidiary company would most likely be brought out. In addition the syndicate had also obtained large interests in two other valuable gold mining properties; on one of these there was a thoroughly equipped plant which would be started in a very short time, while the other, which was 200 acres in extent, was being developed with most gratifying results. Since the inception of the company Monsieur de Baron Weber-de-Trensefels, Austro-Hungarian Consul of Antwerp, had joined the board.—A vote of thanks to the Chairman concluded the meeting.

LADY EMILY GOLD MINING COMPANY (LIMITED).

The statutory meeting of the shareholders in the Lady Emily Gold Mining Company (Limited), took place at the Guildhall Tavern, on Wednesday.—The Chairman (Mr. Graham King) said the property consisted of 13 acres, and was in close proximity to the Lady Loch Mine which had achieved a splendid reputation. The main reef ran through the centre of the property from north to south east, and had been proved to a depth of 62 feet. It varied in width from 2 feet to 4 feet, and the trial crushings gave a return of 3 ounces per ton. There were two other reefs on the ground, and a fourth had just been discovered showing visible gold. On May 14 Mr. H. T. Rowe, the mine manager, cabled: "A trial crushing of 30 tons has yielded 1 ounce per ton. The stuff caught on the blankets was 24 dwts. to the ton, and an average sample of the tailings 20 dwts."

to the ton of 2240 lbs. The main shaft has been sunk to a depth of 200 feet. The country looks exceedingly well. A new reef 2 feet 6 inches has been found in the north end. The ore contains visible gold. The mine promises exceedingly well for the future."—Mr. Robert James, who has just returned from Coolgardie, also addressed the meeting, and said he had every hope that their property would prove as valuable as the Lady Loch Mine.—Votes of thanks to the Chairman and Mr. James terminated the meeting.

WEST RANDT DEVELOPMENT SYNDICATE (LIMITED).
The first general meeting of the shareholders in the West Randt Development Syndicate (Limited) was held on Wednesday, at the offices of the company, No. 19a, Coloman-street, E.C., the chair being occupied by Colonel Montague Hicks.—The Chairman stated that the property acquired by the company was situated on the Witwatersrand section of the reef, and possessed great potentialities. The area was 5000 acres, and the reef had been tested to considerable depth, the latest assays showing that it was worth nearly an ounce of gold to the ton, and was increasing in richness. Even 10 dwts. would have been sufficient to secure a profit, so the outlook was very cheerful. The syndicate had already been approached with a view to selling a portion of the property to subsidiary companies, but before disposing of any of the ground, it was the directors' intention to ascertain which was the best gold bearing portion to keep exclusively for the benefit of their own shareholders. As evidence of the great value attached to the company's property, he pointed out that all the surrounding ground had been taken up.—Colonel Hicks then read the reports of Mr. Andries Van Driel and Mr. P. J. Poole, who had examined the property, and were very favourably impressed with the appearance of it. In addition to the discovery of gold bearing reefs, there was every indication, on one portion of the property, of a large coal area being in existence.—The meeting concluded with the usual vote of thanks to the Chairman and directors.

MINING IN CORNWALL

AND DEVON:

NOTES ON MINING IN THE WEST.

(FROM OUR OWN CORRESPONDENT.)

LEVANT shareholders at the meeting on Tuesday decided to revert to the system of management by committee, which was abandoned some time ago in favour of "one man power." When the "one man" is so efficient and popular as Major White, the present purser and manager, the system is even at its best, and undoubtedly the Levant adventurers have had very little to complain of. During the last few years many improvements have been introduced at Levant, chief among them being the adoption of steam haulage in place of horses, the introduction of ponies underground for drawing ore stuff, and the telephonic installation which has so greatly facilitated operations in the mine. All these progressive measures have been strongly advocated by Major White, and there are few committee managed mines which can show such a record. But apart from the personality of the individual on whom the sole responsibility of managing a great mine like Levant is devolved, the system of unchecked control by one man is entirely out of harmony with modern notions, and the manager has done wisely in offering no opposition to the appointment of the committee. The gentlemen appointed to serve upon it have a big stake in the mine, and their co-operation is sure to strengthen Major White's hands.

The results of the 16 weeks' working were fairly satisfactory, although a balance against the adventurers was shown of £768. The state of things is not, however, nearly so bad as it looks on the face of it, for the payments included £325, half the cost of the new traction engine, and £130, the cost of the engine for the submarine portion of the mine. Had it not been for these and other extraordinary items, there would have been a small profit.

The adoption of the Killfretth committee's scheme of conversion marks the close of the long controversy, and another addition to the number of Cornish Limited Liability mines is now assured. Killfretth is a much smaller concern than any of the others which have abandoned the Cost-book, and its progress under the new conditions will be watched with especial interest on that account.

One effect of the recent legislative proposals of the Government was seen in the opinion expressed by Mr. F. Oats, that as Her Majesty's Ministers were in a generous mood, and that mining is suffering from as great a depression as agriculture, an appeal might be made to them for some relief in the rating. It was decided on his proposition to send a letter to Mr. Bolitho, M.P., asking him to draw the attention of the Government to the distressed condition of tin and copper mining in Cornwall, and asking for some relief similar to that proposed to be given to agriculturists in the Agricultural Rating Bill. Surely this is the forlornest of forlorn hopes.

WHEAL AGAR engine is to be started at last; at the time of writing the fires are alight, and the long suspended pumping operations will recommence almost immediately. No decision has yet been come to with reference to the arbitration, but it is to be hoped that a settlement will speedily be arrived at.

THE FEDERATED INSTITUTION OF MINING ENGINEERS.—The 21st general meeting will be held, on June 4, 5 and 6, in the rooms of the Institution of Civil Engineers. Agenda: Thursday, June 4: 12 noon: General meeting in the rooms of the Institution of Civil Engineers, 25, Great George-street, Westminster, London, S.W. The following papers will be read, or taken as read:—"Presidential Address," by Mr. Geo. A. Mitchell; "The Causes of Death in Colliery Explosions," by Dr. J. S. Haldane; "Road Engines," by Mr. John McLaren; "The Robert Freezing Process of Shaft Sinking," by Mr. A. Gobert; "Precautions Necessary in the Use of Electricity in Coal Mines," by Mr. H. W. Ravenshaw. The following papers will be open for discussion:—"Photography in the Technology of Explosives," by Mr. Alfred Siersch (Trans., vol. xi., page 2); "Coal Washing Plant at the Wirral Colliery, Neston, Cheshire," by Mr. J. Platt (Trans., vol. xi., page 55); "Lead and Lap of Winding and other Engines," by Mr. Hargrave Walters (Trans., vol. xi., page 64).—5 p.m.: General meeting will be closed.—7 p.m.: Dinner in the Duke's Room, at the Holborn Restaurant. Ticket 5s. each, exclusive of wine.—Friday, June 5: Excursion No. 1: 9.30 a.m.: Visit the works of the Electric Welding Company (Limited), 21, Hindon-street, Finsbury, E.C., and inspect the Thompson electric welding process. The visitors will be received by Mr. R. J. Wallis-Jones.—12 noon: General meeting in the rooms of the Institution of Civil Engineers, 25, Great George-street, Westminster, London, S.W. The following papers will be read, or taken as read:—"Powdered Coal Firing," by Mr. Bryan Donkin; "The Southern Limit of the Nottinghamshire Coalfield," by Mr. G. E. Coke; "The Indian Goldfields," by Mr. L. G. Charleston; "The Witwatersrand Goldfields," by Prof. L. de Launay; "Mechanical Roasting of Ores," by Mr. Horace F. Brown; "Lake Superior Mining Ore Region, with Special Reference to the Masabi Range," by Mr. Horace V. Winchell. The following papers will be open for discussion:—"The Eastern Limits of the Midland Coalfield," by Prof. Ed. Hall, F.R.S. (Trans., vol. xi., page 9); "The Goldfields of Matabeland," by Mr. F. G. Shaw (Trans., vol. xi., page 29); "Electric Welding," by Mr. T. Scott-Anderson (Trans., vol. xi., page 40). The Miller smoke and gas mask will be exhibited.—4 p.m.: General meeting will be closed.

PARIS LETTER.

(FROM OUR OWN CORRESPONDENT.)

Impediments to mining enterprise in France.—Neglected opportunities for the employment of capital.—Investments in foreign mines.—Some new undertakings.—Quietness in the Kaffir market.

INDUSTRIAL enterprise in this country is in the anomalous position of starving in the midst of plenty. There is an abundance of capital waiting to be invested in mining and similar undertakings, if only the guarantees held out of reasonable returns were sufficiently tempting, and investors are constantly complaining that they have little or no chance of turning their capital to profitable account. The experience is not a new one, as it is the outcome of a condition of things that has strangled every attempt to open up the mineral resources at home and in the colonies for years past. The primary cause of this stagnation is an entire absence of confidence or sympathy between the investor and company promoter, or rather the directors, whose failings in the past to carry out mining enterprises successfully have left them with a heritage of, perhaps, unreasonable suspicion. Their methods are said to be extravagant and impractical, and they too often spend the shareholders' money in a complicated system of organisation, so that the actual working capital is too small to permit of satisfactory results being obtained. Then the company promoter finds himself so much impeded by the company laws that he is frequently obliged to abandon the attempt to float a concern for the working of promising properties, because he cannot see his way to fulfil all the numerous obligations imposed upon him, and in the event of a successful flotation he is the object of attentions on the part of the fiscal authorities that make his preliminary negotiations extremely onerous. The duties and taxes upon industrial companies are increasing to such an extent as to constitute a serious check to the carrying out of new enterprises. Investors refuse to place their money in native undertakings when they are obliged to disburse a heavy percentage of their profits, and rather than do this they prefer to put their capital in foreign companies. The situation is thus exceedingly unfortunate for the industrial prosperity of the country, because there is not the slightest doubt that, with proper encouragement, the mineral resources of France and the colonies could be developed to a surprising extent. There are magnificent ironstone deposits in the Basques Pyrenees which have had to lie unworked for many years past because the fiscal laws relating to companies constituted a burden too grievous to be borne. Nearly every other mineral exists in this country in payable quantities, and with proper encouragement they could be made to yield profitable returns. It is a fact of common notoriety that Algeria possesses the finest known phosphate deposits in the whole world, and copper and other metals are also capable of being worked upon a remunerative basis. It is true that their exploitation has been undertaken by British capitalists, who have shown that it is possible to create a very flourishing industry under the most adverse conditions, but having done this they have been compelled to abandon the enterprise through the jealousy of the French Government, and the districts which were beginning to experience the advantages of a prosperous industry, are now falling into decay.

Nevertheless, the French capitalist is not disposed to sit with folded arms because the law of company promotion, and the local burdens which are placed upon the mining industry prevent his participating in undertakings at home. The revival of financial enterprise during the past year or two has inspired capitalists with a desire to make something out of the mineral development of other countries where foreign financiers have already succeeded in building up enormous fortunes. Madagascar has awakened a good deal of interest through its reputed possession of rich auriferous deposits, and it seems that the Suberbielle Company is very actively pursuing its work of laying down railways and gold recovery plant in view of treating the placer and quartz deposits in the most economical manner possible. But Madagascar is the only French possession which has succeeded in securing sufficient capital to carry out a mining industry upon an intelligent basis. As a rule, capitalists are turning their attention to foreign countries, and especially to Russia, Australia, the Transvaal, and America. Several companies have been formed of late with French and Russian capital for the development of the auriferous deposits that undoubtedly exist in the Ural range and in Siberia. The latest of these is the Société d'Industrie Aurifère Léna, which is being floated by the banking concern, E. M. Meyer et Cie, and Baron Gunzburg, with a capital of four and a half million roubles. At the rate at which gold and other companies are being formed for carrying on operations in Russia, the amount of French capital invested in that country will before long be inferior only to that employed in the South African mines. French capitalists are also associating themselves with Werner Beit and Company with a view of securing mining concessions in Mexico, while French capital is being employed in new companies for the working of petroleum and other deposits in South America. Subscriptions will also shortly be invited in Paris for the Plata Roja Company, which is working some silver mines in Spain, reputed to be of extraordinary richness. It is stated that at a depth of 125 metres the yield exceeds 70 kilos of silver to the ton. The promoters of the Plata Roja concern have for years past been insisting upon the marvellous value of their property, but in spite of the alluring promises held out it has been impossible to raise the necessary capital. Another enterprise in which French capital is taking an active part is the development of the coal measures in Turkey. The Ottoman Bank has just succeeded, after 20 years of negotiation, in securing the concession to work the Heracle Collieries, which are said to yield coal equal in quality to the English. The work of development is to be carried out by some of the leading colliery owners in the Nord and the Loire. This heavy increase in the output of coal, as well in Turkey as in Tonkin and Japan, constitutes a new factor in the competition to be faced by the English coal owners, who find that their monopoly in the eastern markets is being seriously menaced.

This tendency to seek a wider field for the investment of capital is a striking evidence of the change which has taken place in French finance during the past few months. While the Transvaal gold mining industry was free from the political troubles that at present weigh upon it, financiers were disposed to confine their operations to the Rand, where they believed they had a wide enough scope for the employment of all the capital available. But recent incidents have shown that the position is a much more precarious one than they had anticipated, and while capital is prevented for the moment from going more freely into South African mines the different syndicates, who cannot afford to await their opportunity, but must seek it in the most likely places, are extending the field of their investigation. At the same time the Rand mines still enjoy a popularity which has only been partly affected by the troubles that have blighted the industry. Shareholders are not inclined to withdraw the vast amount of capital that they already possess in the Transvaal mines, even if it were possible to do so without sustaining heavy losses, and they have sufficient confidence in the future of the industry to continue their interest in the different companies in the hope that an improvement in the political outlook will very soon give a fresh stimulus to South African investments. In the meantime, business in the Kaffir market is practically at a standstill. Holders are not disposed to realise when there is a certainty of a recovery at a more or less distant date, and investors believe that until the situation begins to show signs of improving the moment is not opportune for taking up Rand shares. The market is, moreover, entirely under the influence of the bears, who have persistently depressed Buffale-

doorn, East Rand, Chartered, Gold Fields, and other of the leading shares, and if prices have not dropped further it is only because holders are firmly convinced that the influence of the crisis upon the industry can only be a temporary one. Shares have fluctuated very little upon their present low basis during the past fortnight, and on Thursday there was a notable tendency on the part of some of them towards further strength.

CORRESPONDENCE.

We wish it to be understood that we do not hold ourselves responsible for, and do not necessarily endorse, the opinions of correspondents. All communications must be accompanied by the names and addresses of the senders, though these need not necessarily be published.

COMPLETE AND CHEAP GOLD EXTRACTION.

TO THE EDITOR OF "THE MINING JOURNAL."

DEAR SIR,—If you will allow me a little more of your valuable space, I should like once more to discuss the Zymean process. My previous letters have been mainly letters of enquiry, and since writing them I have, through the courtesy of Admiral Selwyn, been placed in full possession of the details (so far as they are known) of the process. I am, therefore, in a better position to discuss it than I was before my interview with Admiral Selwyn.

Before offering my views, it would be advisable to put down concisely what the process consists of, and, in doing so, I will confine myself only to the solution of the mineral contents of the ore, and the subsequent recovery of the gold. It is well to mention here that we are dealing with the Zymean process and not the De Rigaud, since Admiral Selwyn claims to be the prior inventor.

Briefly, the process consists of treating the ore with sulphur chloride (S_2Cl_2), and a saturated solution of common salt, at a temperature of about 180° , whereby the sulphides, &c., when present, are dissolved. Sulphurous acid is given off from the dissolving tank, and is used to precipitate the gold from the filtrate. Here I may mention a fact which has not come to light in the correspondence—viz., that when gold is present nitrate of soda must be added in the proportion of 1 ounce of nitrate per ounce of gold present.

If sulphur is not present in the ore, then sulphur must be added. The quantity of S_2Cl_2 per 5 tons of ore is put down at about 1 gallon, and the quantity of salt solution at 3 tons per ton of ore. I propose to confine my remarks mainly to complex pyritic ores, as these are of more importance than free milling ones.

Concerning the chemistry of the process, I have been unable to obtain any direct statement with equations which would offer any satisfactory explanation of the small quantity of S_2Cl_2 required. I have even been told that the S_2Cl_2 is not regenerated during the reaction, and this I myself believe. I cannot, therefore, see why we should reject the ordinarily accepted reactions of S_2Cl_2 , until something else is offered. I think, also, that this compound should be styled the chloride, as SCl_2 also exists, and this latter would be the dichloride.

Sulphur chloride decomposes water in accordance with the following equation:— $2S_2Cl_2 + 2H_2O = 4HCl + SO_2 + 3S$.

In my opinion, it is this nascent hydro-chloric acid which attacks the sulphides and dissolves the metal therefrom; nor do I see how free chlorine is produced. This is borne out by the fact that the inventor adds nitrate of soda when gold is present in the ore. However, it is quite possible that gold would go into solution without the nitrate in the presence of nascent hydro-chloric acid.

In fact, according to the published statement of Proust, finely divided gold is soluble in hydrochloric acid; he even doubts the necessity of air as an aid to solution. If the above reaction represents what takes place, then it is difficult to see how the gold is to remain in solution in the presence of sulphurous acid.

I have made some experiments on gold leaf, using S_2Cl_2 , and strong salt solution, with and without the nitrate, and I find that the gold goes into solution, but is immediately reprecipitated as brown gold, so that the nett result is no gold in solution.

With ores I think that some gold may go into solution at one time, and be reprecipitated shortly after, so that it is impossible to get the whole of the gold as chloride in solution. Now, in my opinion, much of this reprecipitated fine gold would be mechanically caught up in the liberated sulphur, and thus the quartz or other tailings may show no gold on assay. But if Admiral Selwyn will analyse his sulphur I should not be surprised if he found much gold there. Of course, this gold could easily be recovered from the sulphur by burning, &c., but that is not the Zymean process.

I have myself tried to treat a complex pyritic ore by this process. The ore contains about 23 ounces of gold per ton and about 60 per cent. of various sulphides, and though I have used more than 100 times the authorised quantity of S_2Cl_2 , I have not effected anything like the entire solution of the pyrites.

I suggested that a representative of the Zymean process should come and treat about 20 lbs. of one of my ores, and I should be very pleased to publish any successful results; but, apparently, this could not be arranged, so I have been experimenting on my own account, aided by the information supplied (I admit without special experience or actual demonstration by those more cognisant of the process), on much smaller quantities of ore, intending, if my experiments were satisfactory, to proceed to a larger test.

I think the foregoing remarks embody a reply to General Tweedie's letter of the 11th inst., and I will only add that until I have seen a large test carried out I cannot understand how the process can work, using the small amount of S_2Cl_2 advised, and in face of the other objection mentioned—viz., the presence of sulphurous acid in the liquors.

I should like to have expanded my remarks throughout but that I fear I have already taken up too much of your space. Apologising for the length of this letter, and thanking you for your courtesy in inserting my previous communications, I am, Sir, yours faithfully,
HUGH K. PICARD.
London, May 20.

MINING IN BRITISH COLUMBIA.

TO THE EDITOR OF "THE MINING JOURNAL."

SIR,—In his article on "British Columbia" (Journal, April 4) under sub-head "Trail Creek," Mr. Fellow Harvey says:—"During 1874 no properties were being worked except the Le Roi, War Eagle, Josie, Nickel Plate, and O.K." As one of the pioneers of Rossland, I am in a position to state that at that date not one of those mines had been thought of. The first location made in the camp was in May, 1890. The Le Roi, War Eagle, and Josie were recorded in July, 1890, the Nickel Plate in September, 1890, and the O.K. in January, 1892.—I am, Sir, yours respectfully,
GILBERT W. A. RANKEN.
Rossland, West Kootenay, B.C., April 29, 1896.

THE MICROSCOPE AS USED IN MINING.*

By J. A. EDMAN Plumas.

IT is not necessary to look back many years to remember the time when the microscope as an instrument of research and scientific investigation was confined to a few of the learned professions, to a limited number of the most advanced thinkers and workers in natural science, to physicians, physiologists, botanists, and a few chemists. To most of us here present it was once seldom seen, and still less appreciated, as an instrument of precision. Later, with the advance of optical science and improved mechanical methods, it became the familiar and constantly efficient instrument not only in the schools and halls of science, but in many departments of manufacturing industry, to which it gave a precision and certainty never before attained. To-day we find it in every civilized country the aid of the teacher, the guide of the philosopher, the scientist and the practitioner, the counsellor of the manufacturer, the aid of the engineer and constructor, the beneficent adviser of the farmer, and last, but not least, the guiding light among the hitherto empirical practices of the metallurgist and miner.

—And not only this. But the cares and worries of the business man have been lightened when he made it the companion of his leisure hours, and its kindly light brought him near to Nature's heart and opened to his vision the power, wisdom, and perfection the Creator.

Not long ago an eminent member of this society gave you the history of the origin and development of your favourite instrument to its present high state of perfection, and showed its application in solving the problems of geology, dealing with the upbuilding of the earth and the constantly recurring cycles of decay, reconstruction, and change in our plains, valleys, and mountains. Although but a comparative novice in the use of your favourite instrument, perhaps I may be entitled to continue the story and tell you some of the truths it has taught me in one of the oldest, and even to-day one of the most important, industries of California, that of gold mining. In this I use the term in its broadest sense as applied in the Pacific States, where mining also includes the metallurgical processes for the reduction of our ore, usually called milling, and the separation of the gold from the enclosing gravels and sediments. For convenience I will divide the subject into two parts, the first concerning the physical conditions of our gold-bearing ores, including the various mill products; the second referring to the studies of the golden sands derived from our gravel deposits. It is true that the placers were first discovered and worked in this State, and from them the most of our wealth of gold was derived, but they have to this day remained the least observed and studied by our miners, as the sequel will show.

From the earliest days of quartz mining and milling in 1850, when scarcely any previous experience pointed the way, and only the mill practice of Germany was available, if they had been known to our miners, all advance was based upon constant experimenting, which generally resulted in improved mechanical appliances, which finally developed into our present practices of milling, which yet in no sense can be said to be a system. All milling operations were, and yet remain, based upon the delusive belief that gold, being one of the heaviest metals, must always and under all conditions descend to the lowest level and become arrested by its affinity for mercury without any special effort of the operator to so modify the obstructions to the general law of gravity and chemical affinity as to permit of its full operation in the quartz mill and connected apparatus. This might have led to results had gold ores been uniform in character, had comparatively coarse grains of gold been enclosed in a simple rock or mineral, impervious to and not exerting a mechanical or chemical action on the mercury in use in amalgamation, could it be what the millman and miner dream of so-called free milling ore, a condition practically as impossible as for the physician to meet in his practice with a perfect man. In fact, our gold ores occur in all conditions and combinations, from the hard, white and crystalline quartz to the crumbling, brown-black sand of manganese ores; from the tough carbonaceous hornstone of the mother lode to the soft and yielding talcose slates from the altered diabase; from the hard quartz brought from the deepest mines, sparkling with crystals of pyrites and galena, and in spite of its richness scarcely exhibiting to the unaided vision a trace of metallic gold, to the crumbling and dusty limonites of our decomposed surface ores, where the gold may range from visible grains and crystals to the microscopic dust that almost coats the air.

No classification of mill processes in accordance with physical conditions has yet been evolved, and cannot be attained without calling the microscope to our aid. What, then, does it teach and will prove to any earnest investigator? That in nearly all its ores the gold generally occurs in infinitely small particles, diffused unevenly both in the rock matrix and in the sulphides and other combinations and elements; that in most instances this diffusion is to the ordinary observer almost incomprehensible, although familiar to the student of micro-organisms. In the few slides I have brought here you will find the diffusion of gold in quartz beautifully exemplified in a sample from the Diadem Mine, where the size of the gold particles frequently reaches one twelve-thousandth of an inch diameter, and generally averages below one two-thousandth inch; and another from the San José de Gracia Mine, in Mexico, where the diffusion of both gold and silver reaches one thirty-thousandth inch. These are not extreme cases, although in many gold ores of California the size of grain only goes somewhat below one two-thousandth diameter.

The same condition is observed in the sulphides, and principally in the iron pyrite, the arsenical pyrite, and in galena, although here the diffusion does not reach the extreme sizes noted in silica. But here occurs another condition, as hostile to free milling as that already cited—the chemical union of gold with sulphur, arsenic, selenium and tellurium, which my work has conclusively proven, although the fact has been disputed by many chemists and metallurgists. It is especially noticeable in arsenical sulphides and their decomposition products, in which latter the gold is precipitated in crystalline and arborescent forms, built up atom by atom from a precipitation of the soluble gold compound.

The greatest loss in milling may be stated as due to the diffusion of infinite gold particles in the quartz, not set free by the usual processes. Noting that the common practice of gold milling has fixed upon forty-mesh screen in batteries as a limit, or an average size of one-fortieth inch diameter of grain, to which the ore is reduced, it is readily perceived that much gold still remains enclosed in the sands in a condition not available for amalgamation, and, by reason of its low specific gravity, not amenable to amalgamation.

A close study of amalgams and related products proves that amalgamation of both gold and silver is essentially a chemical union, and not a simple solution of gold in mercury, as the resulting products always combine to an amalgam in equivalent

proportions and form crystals that are modifications of the cubic system. The three forms I have met with—the acicular, the prismatic, and the octahedral—are exhibited by slides I shall place before you, in each of which the percentage of gold and mercury differ, containing the most mercury in the order given. In each case the mercury has been eliminated from the sample by solution in dilute acid, as the original amalgams are generally too fragile and deliquescent to be made into mounts.

My work has illustrated that time is an element in all amalgamation, graduated according to size of gold particles, and that the general law holds good that the best condition for amalgamation obtains when proper proportions of gold and mercury are present to form the two last-named varieties of gold amalgam.

Amalgamation is also seriously affected by the form of the rock particles in the pulp, and by capillary attraction, which fully explains the causes of flouing of mercury and the impossibility of successfully amalgamating talcose ores without previous preparation. Here the microscope reveals the curious condition that the smooth scales of talc, microscopic in size, become firmly attached to the cleanest mercury, and rapidly form a semi-transparent crust, preventing the contact of gold with the amalgamated surface of the plate.

Of this scum I have here available only a working mount, but the fact has been fully investigated. A very instructive mount of rich waste sands is also at your service, taken below the plate table of a quartz mill.

The foregoing facts explain the main causes of the great loss of gold yet occurring in milling operations, and also suggest the remedy—namely, a full investigation of the physical conditions of the ore before a plant and mill process are decided upon, instead of the ruinous practice of discarding an expensive plant or abandoning a mine, virtually made a failure by lack of skill and judgment.

Time forbids me to enter into the details of the amalgamation and cyanide processes, of which the latter especially most speedily demonstrates its effectiveness or its shortcomings under the microscope in conjunction with chemical analysis.

The most interesting study of the genesis of ore deposits will receive its solution through the patient and intelligent use of the microscope, in which direction my own very desultory and incomplete labours can only be presented to you by a few slides and ore samples.

When we enter the division of the gold-bearing gravels as found in California's surface and deep deposits, the results of erosion during several geological periods, it presents another wide field for microscopical research, and this chiefly in the auriferous heavy sands, which represent not a little of the values and the most interesting objects of study for the microscopist, as they contain virtually the heaviest and most imperishable minerals of the adjacent rock formations. In the black sands of the Pacific Coast we meet not only the heavy metals generally obtained in mining operations, such as gold, gold amalgam, platinum and iridium, but also metallic copper, nickel and iron; next, many of the sulphides and arsenides of our lodes, such as pyrites, mispickel, bornite, galena, and, finally, a great variety of oxides and silicates, such as magnetite, chromite, limonite, ilmenite, cassiterite, zircon, garnet, tourmaline, epidote, corundum, beryl, and diamond, the last generally in very minute grains. In size of grain these sands generally run below 1-40th inch diameter, and a large portion are of microscopic sizes, the gold particles often averaging below the 1-1000 inch in diameter, and, consequently, not at all amenable to the usual processes of placer and hydraulic mining.

Of the gold, a portion of it is clean and bright; much of it is coated with the oxides of iron and manganese, with silica and lime sulphates, and also with sulphides and selenides, frequently so much so that the gold colour does not become perceptible without previous preparation. The sulphide grains, generally very minute, are often rich in gold, chemically combined or mechanically enclosed, and what is still more important, the magnetites, hematites, and chiefly the ilmenites contain metallic gold enclosed within the hard and lustrous grains of these minerals, as will be shown to you in some of the mounts submitted. Everywhere the constant progress of chemical action is present in the gravels in the leaching out, transposition and subsequent precipitation of both gold and other elements and minerals, in the presence of secondary deposits of silica, alumina, and hydrated silicates, in sulphides and arsenides, and in the many and beautiful forms of precipitated gold in crystals, and in acicular and arborescent forms of wonderful variety, some of which can be shown you.

While these evidences of beauty, order and constant activity in Nature's great laboratory will ever delight the student of natural laws, they offer no small rewards to the miner and investor who may view them solely from a commercial standpoint. After extracting all of the visible values by ordinary mining operations, the black sand and the waste gravels from which they result always contain gold varying from a few dollars per ton up to and exceeding \$5000 per ton for the richest black sands, with probably an average of \$40 per ton for concentrated heavy sands. As the cost of concentration and extraction of the valuable contents will seldom exceed, and generally go below, \$20 per ton, they promise great rewards to men of skill, energy, and capital, and intelligently handled will add much to the wealth and progress of our State.

Looking back to the period when the geological survey of California was in progress under the able guidance of Professor J. D. Whitney, some of the members present may recollect his prophetic words as to the future of our waste gravel deposit, and his suggestions as to necessary legislation on the subject, and taking up the two volumes of the "Auriferous Gravels of California" and noting therein the discussions on the physical features of the gravel deposits, you can readily recognise that my work is only a continuation of that by Whitney, Pettie, and Goodyear, and that part of the problems confronting them have now been happily solved.

At the period referred to when the Geological Survey was discontinued, when our Legislature then, as frequently of late years, was controlled by lobbyists and pothouse politicians, all the great material laboriously collected by the Survey was consigned to oblivion, and remains yet unused and inaccessible somewhere among the classic halls of Berkeley. Had the volume on economic geology as projected by Whitney been published, the doors of a vast treasure house would 30 years ago have been opened to the citizens of California, and the State would have been richer by at least \$300,000,000.

I here take occasion to render, on behalf of the miners of California, a cheerful and well-merited tribute to Professor Whitney, whose powers of perception, lucid reasoning, indefatigable energy and unerring judgment in regard to the economic geology of California have done more to make our placer mines known and appreciated than all the men of science that have but followed where he blazed out the trail.

To those of your society who, like Melville Atwood and Henry G. Hanks, have studied our ores and minerals, and also left honorable records and valuable aids to the miners of California, I tender their well-merited meed of honour, and will venture to hope that your society, while adding lustre to California's record in the paths of science, will not forget the needs of our miners, the beauties, the uses and the silent teachings of Nature,

as revealed in our rich and useful ores and gravel deposits, in our marbles and building stones, our borax, soda and salt deposits, our asphaltum and mineral oils, which form the substratum on which Nature has placed our plains and smiling valleys, our pure and ever-flowing streams, our grand forests and our heaven-reaching and snow-covered Sierras. — *Mining and Scientific Press.*

LATEST FROM THE MINES.

CABLEGRAMS AND TELEGRAMS.

ANGLO-MEXICAN.—April output, \$61,000 bullion; \$400 concentrates.

ACHILLES GOLD FIELDS.—Cablegram from the managing director at the mine:—"No. 5 level will place at our command a valuable body of high grade ore, likely to average high crushing."

CARRINGTON.—The manager, Mr. Alan B. Bright, cables from Charters Towers:—"The men working on tribute in Craven's Caledonia on the Victoria reef. Crushing yielded 27 dwts. per ton. Within 30 feet of our boundary."

CHAMPION REEF.—This company has received the following telegram, dated May 18, from the superintendent:—"Crush cut has cut the lode 740 Ribblesdale's shaft 4 feet, assaying 1 ounce 2 dwts. per ton."

CHAMPION REEF (Nannine, W.A.).—Translation of cable received from Mr. R. Ford (local secretary), dated Melbourne, May 18:—"Report by telegraph drives continued in high grade ore. Have driven along over 200 feet. Opened up large body of ore; superior stone."

CRESCENT.—The following cablegram, dated May 18, has been received from the superintendent, giving the result of the first month's crushing:—"400 tons inclusive of 200 tons heaple low grade ore on the surface—226 ounces."

CRIPPLE CREEK PROPRIETARY.—Mr. O. C. Sargent, the local director, cables:—"The property. 300 gold-bearing claims and town site, aggregating altogether 3000 acres, has been transferred to the company."

DAY DAWN BLOCK AND WYNDHAM.—Cablegram from the general manager at Charters Towers gives the result of the crushing for the fortnight ending the 16th inst. as follows:—"Tons crushed, 1030; yield of gold, 1121 ounces; approximate value, £3865; fortnight's expenses, £1850."

DON PEDRO.—Produce for the half month 1100 oitavas = 126 ounces 16 dwts. from 225 tons = 11 dwts. 6 grains per ton.

FREDERICK THE GREAT.—The following cable has been received from the manager at Bendigo:—"Crushed 250 tons, obtained 104 ounces of gold. Is most satisfactory. The two levels are now connected."

GROOTFONTEIN EXPLORATION.—Cablegram from the mine manager states that first bore has been commenced.

GOLD CONSOLS.—Cable from the resident manager of the Ivanhoe Consols Gold Mines (one of the company's properties at Hannan's):—"Struck good lode 28 feet in width, lease 1384, showing visible gold."

GOLCONDA.—Cablegram received from the mine manager of above company, dated May 20:—"Reef No. 2 north wins 75 feet level, now 4 feet 6 inches, turning north-east; as the breast of the level is advanced the ore is becoming richer, showing visible free gold. In the north end 75 feet high grade ore body still continues, and, going down, mine is looking well and promises better. Vendors paid. The railway is now open 53 miles from Mullewa."

GOLDEN HORSE SHOE.—Translation of cable received from Messrs. Bowes, Scott, and Co., the resident engineers to the company:—"Have commenced. Propose to place shaft at from which to work Ivanhoe lode. The lode looks exceedingly promising."

HANNAN'S SIR JOHN FORREST.—The following cable has been received from the manager, Mr. J. Woolcock:—"Since last report the main shaft has been sunk 7 feet; total from surface 134 feet; crosscut extended 9 feet; total 41 feet from shaft. At No. 2 shaft have driven 15 feet south on the course of the lode; total 73 feet; lode is opening up well. No. 3 shaft has been sunk a further depth of 11 feet; total from surface 56 feet."

HERBERT.—The following cable has been received from one of the directors who is on a visit to Coolgardie:—"Inspected Herbert Gold (Limited) to-day. Prospects are most encouraging. Saw personally ore raised. The gold is coarse and fine. I believe the ore will assay at least 6 ounces to the ton. The ore is 7 feet thick. 300 tons of ore on the dumps. Will cable as soon as the result of the trial crushing is known. The shaft is now timbered down to 80 feet."

KAPANGA.—The following cablegram has been received from the mine, dated May 19:—"Have much gratification in stating are getting rich ore in this shaft, pieces of quartz rock in free gold. The width of the reef is 9 inches. This is of the greatest importance with regard to the future prosperity of the mine. Gives great satisfaction to myself." (Signed) Captain Argall.

KAPANGA.—The directors have received the following telegram from the manager, viz.:—"Have much gratification in stating am getting rich ore in the shaft. The width of the reef is 9 inches. It is of the greatest importance with regard to the future prosperity of the mine."

KAPANGA.—The directors have received the following telegram from the manager, viz.:—"Shaft has been sunk 4 feet for the week. There are two distinct veins in the shaft showing gold freely. There is every reason to believe the veins improve as they go down; much pleased with the appearance."

KING SOLOMON'S.—The following cable has been received from the engineer at the mine:—"7 tons crushed during the week, yielding 2 ounces of gold per ton."

LADY MARGARET.—Copy of cable received, May 18, from Goongarrie:—"Struck a good body of ore at a depth of 70 feet other workings looking well."

LAKE VIEW SOUTH.—Cable received from Mr. George Gray, M.E., engineer and general manager of the mines, dated Kalgoorlie, W.A., on May 16:—"Lake View South. Shall start the mill crushing during the present month. Pump nearly completed. There is an abundant water supply."

MAY CONSOLIDATED.—The following cable message dated Johannesburg, May 16, has been received at the London office:—"The profit for past month (April) was £2089."

MOUNT GREENOCK GOLD ESTATES.—A cable states:—"The Greenock leases duly transferred and registered against company's name."

MURCHISON NEW CHUM.—The following is translation of cable received from the mine:—"There is no truth in the rumour that a rich streak of ore has been found.—Level No. 1 driving north. Have cut ore chute in the level 500 yards. Nothing payable has been met with as yet. Have started to crosscut to the east.—Level No. 2. Have ceased work at present. Bottom level has at present a length of 120 feet. The vein is small and poor. The rise is now up 72 feet. Have cut a small vein at this point. The works are now in good order. We are now pumping 140,000 gallons of water per 24 hours. Found

* An address delivered at the rooms of the Microscopical Society, San Francisco.

tions very good and substantial. All machinery in good order, and working well. North Chum had the fairest possible trial; second 100 tons, 8½ dwts. I shall shut down the mill, except for trial lots. Now cleaning-up. Will report result soon as possible.

MYSORE.—The following cablegram has been received from the superintendent: "1360 feet level north of Rows's shaft with of lode 7 feet, assaying 4 ounces 10 dwts. per ton (Crocker's chute)."

NEW CHUM (Bendigo).—In cable received from Mr. L. A. Samuels, dated May 12, a portion was unintelligible, and although a repetition of that portion was asked for and obtained, the following is a translation of the only words that can be found in the code used:—"Crushed 20 tons as trial, result is 6 ounces, result very satisfactory; reef will be found of better quality at the bottom level; we are too high on formation at present; sinking as quickly as possible." A further cablegram states:—"In the opinion of the Local Advisory Board of the Bendigo Gold Fields (Limited) the outlook of the New Chum is very favourable." A further cablegram states:—"Since last report the main shaft has been sunk 10 feet; total from plat, 13 feet, and from surface 595 feet. Expect to open out east in three weeks."

NEW QUEEN.—The London office has received the following cablegram, dated Charters Towers, May 16:—"No. 5 formation 1270 feet. The vein continues to look about the same. Have stopped work other parts of the mine."

NIKKERK.—Cablegrams have been received stating that the old workings have been reached, and that assays show from winze A1, 24 dwts.; from winze 2, 15 dwts.; and, from winze 3, 22 dwts. per ton.

NORTH BOULDER.—The following cable has been received from the mine manager of the North Boulder, dated the 22nd inst.:—"Discovery is of great value in the west shaft. Average assay value per ton of 2240 lbs, 24 ounces (2); picked sample 60 ounces ore shows heavy visible gold." The word signifying 24 ounces is being repeated, as it seems doubtful, although the cable company think that there is no mistake. They are of opinion that the code word must either mean 24 ounces or 30 ounces.

ORITA.—The directors have received the following cablegram from their superintendent relating to run No. 90:—"We have cleaned up £250."

OURO PRETO.—This company has received a cablegram, giving the April returns as follows:—"Passagem Mine. 4000 lbs. produced 1562 ounces.—Raposos Mine. 380 tons produced 61 ounces."

PAHANG CORPORATION.—Returns for April:—"Jeram Lumpur Mill. In 25 days of 24 hours each 920 tons of stone were crushed producing 45 tons of black tin; 20 stamps running; working costs, \$10,250.—Jeram Batang mill. In 24 days of 24 hours each, 850 tons of stone were crushed producing 35 tons of black tin; 20 stamps running; working costs, \$7250."

PLAYA DE ORO.—A cable just received from New York says:—"Mr. John P. Petty, who has been engineer-in-charge of the mine for the last five months, has just returned from Ecuador. He did not inspect the entire mine, but states that he examined about 3000 acres of auriferous gravel (being the deposits in the immediate vicinity of the Boqueron bank on which he was at work), and he estimates that this gravel will average at least 30 cents per cubic yard. He is also of opinion that had not the Boqueron bank been too short and the grade too steep, allowing fine gold to escape, the gravel already washed would have yielded 20 cents per cubic yard, exclusive of bed rock, instead of 13 cents per cubic yard. This is a matter which can be easily remedied. The Boqueron bank, on which washing is now being done, is 80 feet high, and over 70 feet of this blue auriferous gravel covered by a layer of ordinary loam. The bank was easily, and has not yet been washed far enough back to make it safe for the workmen to clean up the bedrock, which naturally contains the heaviest and richest gold. The results thus far show that this gravel is exceptionally rich in gold. The company has received over \$20,000 gold bullion as a result of partial clean ups of the sluice boxes only. They have just been advised of another partial clean up, \$2900."

PULIDO.—A parcel of copper ore, principally selected from the old dumps, has been supplied and sold yielding about 11 per cent of copper and 15 dwts. of gold per ton.

PREMIER TATI MONARCH REEF.—The directors have received the following information by cable from the general manager at the mine:—"Recommended day crushing May 11, 15 stamps. Black labour is scarce on account of the war."

QUEEN CROSS REEF.—The London agency has received a cablegram from Charters Towers, dated 19th inst. (delayed in transmission), announcing a further crushing of 382 tons for 100 ounces, making a total of 632 tons for 1754 ounces of gold. Approximate value, £6050. Tailings from this crushing are in course of treatment, and not included in this return, but will be considerably to the total.

SALISBURY—MURCHISON.—Cabled advice from Mr. W. Wattis, the company's general manager, state that there was a loss of 14 dwts. per ton left in the tailings in the late trial crushing of 136 tons of Salisbury ore, which realised 174 ounces. Agammon. Trial crushing of 50 tons of ore from the engine shaft gave a gross yield of 61 ounces, and the assay of the tailings shows a loss of 2½ dwts. per ton.—Tasmania. Trial crushing of 25 tons gave a gross yield of 24 ounces. The amount left in the tailings is not stated.

SOUTH BENDIGO.—Mr. L. A. Samuels cables:—"Since last report the main shaft has been sunk 10 feet, total from surface 602 feet."

SOUTHERN NEW CHUM.—Copy of cable received from Mr. L. A. Samuels:—"Since last report the main shaft has been sunk 32 feet; total from surface, 192 feet."

ST. JOHN DEL REY.—The following telegram has been received from Mr. Chalmers:—"Produce 11 days, first division May, 8000 oits., equal to 980 ounces troy; value, £3294; yield per ton, 46 oits. (53 ounces troy.) Unwatering (the old excavation) progressing satisfactorily."

STRICKOP FARM.—The following cable has been received from the mine, dated 18th inst.:—"Mine has been opened up. The ore bodies opened up by the developments already amount to more than 30,000 tons. Assays improved."

SUMMER AND JACK.—Last month's profit was £11,463.

SALISBURY—MURCHISON.—The company have received the following cabled information from the manager:—"Trial crushing, level No. 1, engine shaft, 136 tons; total gross yield, 174 ounces. The assay of tailings show a loss of 14 dwts. per ton.—Agammon, engine shaft, trial crushing, 50 tons; gross yield, 61 ounces. The assay of tailings show a loss of 2½ dwts. per ton.—Tasmania trial crushing, 55 tons; gross yield, 24 ounces."

SAN SALVADOR SPANISH IRON ORE.—May 21:—"The daily output from Santander on the 21st inst., with a cargo of the company's ore for Glasgow."

SILVER KING.—Cable from the mines:—"First half May, produced 1000 tons, produced 6100 ounces silver."

TREASURE TROVE EXTENDED.—The following has been received from the manager:—"Treasure Main shaft. Water level has been reached, the width of reef is 2 feet 6 inches; gold is fairly distributed; mine is looking rather better than ever."

TRANSVAAL COAL TRUST.—The following cablegram has been received from the head office at Johannesburg, as bearing on the company's operations for the month of April:—"Output 31,500 tons; profit, £3750."

TATI BLUE JACKET.—The directors have received the following telegram from the general manager at Tati:—"Mill will have a trial run in a few days. Sufficient ore at grass to keep the mill supplied for four months."

WAIHI SILVERTON EXTENDED.—The following is copy of cable just received from the local board:—"Estimated cost of mining and milling at an expense not exceeding £1 per ton is inclusive of all expenses at the mine; this includes cyanide. Shall arrange to clean up June 6. Mill crushed in that time roughly estimated at 900 tons."

WEMMER.—The company has been advised by cable that the profit on the work done during April is £7263.

WAIHI SILVERTON EXTENDED.—Cable received from the mine:—"Have cleaned up after crushing 600 tons of quartz, gross yield £2450. You must deduct from this amount locked up in solutions £400. The result of the last clean up was £2050."

WOODSTOCK (New Zealand).—The mine manager cables under date May 20:—"Got reef 4th level. Assay £25." This is understood to mean that the rich shoot met with in the 3rd level on the Maria lode has now been reached in driving on the 4th level, as was anticipated in the last monthly report by mail dated March 18, and that it assays £25 per ton.

TUNNELLING BY COMPRESSED AIR.

By E. W. MOIR, M.Inst.C.E.

(Continued from page 627.)

WHEN I first went to New York the men had been dying at the rate of one man per month, out of 45 or 50 men employed, a death rate of about 25 per cent. per annum. With a view to improving this state of things, an air compartment like a boiler was made in which the men could be treated homoeopathically, or reimmersed in compressed air. It was erected near the top of the shaft, and when a man was overcome or paralysed, as I have seen them often, completely unconscious and unable to use their limbs, they were carried into the compartment and the air pressure raised to about half or two-thirds of that in which they had been working, with immediate improvement. The pressure was then lowered at the very slow rate of 1 lb. per minute, or even less, the time allowed for equalisation being from 25 to 30 minutes, and even in severe cases the men went away quite cured. No man ever suffers by going into compressed air unless his eustachian tubes are blocked, which is the mechanical effect of the pressure being on one side of the ear drum only. This produces intense pain, and one must go out unless relieved by swallowing or holding the nose and blowing, thereby increasing the pressure in the throat and lungs. The medical lock should be used at once, as it does not appear to have much effect after some time has elapsed. Such an appliance had never been used before it was introduced by us at the Hudson Tunnel. Fortunately there have been no deaths, but there have been some cases of paralysis which were immediately cured in the lock, and there have been a few cases of vertigo, one of which was more or less permanent, though the man is slowly recovering. The great necessity is to have plenty of air, and as the pressure increases, purity must be greater. The bad effects of increase in the carbonic acid are most noticeable if there is a sudden increase of pressure with impure air at the same time, for after a time the men's systems seem to get accustomed to the impurity, for before I found out the above facts in New York, the air in analysis showed a much higher percentage than we have ever had at Blackwall.

The impurity never effects a man while below, but only after he comes out, and we had mules working under pressure in New York for over 12 months at a stretch which sold at good figures after coming out. Another idea of the cause of the disease which occurs to me as possible is, that the blood under the increased air pressure actually absorbs the carbonic acid, as does the water in the manufacture of aerated waters, which may bubble off when the man comes out and stop the circulation. It seems probable that for high pressure it would be well to pass all the air, which usually contains 4 parts of carbonic acid per 1000 on the earth's surface, before being sent down to the men at all, through lime water, thereby taking from it all the carbonic acid it contains; less air would then require to be pumped per man. I have seen a man's veins opened in America whose blood was so thick and black that it had to be squeezed out, not being fluid enough to flow by itself. This man did not recover, and was one of the cases which I think would have been cured by the lock if we had had it from the first. Every man should be medically examined, and hot coffee should be given to each man before he comes out of compressed air; a warm room to dress in, and extra clothing for passage through the lock should be supplied. By introducing the medical lock, and the precautions as detailed, the deaths at the Hudson Tunnel were reduced to only two in 15 months, with a squad of 120 men at work. At the Blackwall Tunnel, with the experience gained and attention to the above points, we have not had a single death, notwithstanding the fact that we had men working under a pressure of 37 lbs. per square inch for some time, while there have been deaths at the Glasgow tunnels at much less pressure quite recently. Generally, sparsely-built men not too full-blooded are those who stand air-pressure best. A man who has weak lungs may work and improve, but one with a weak heart, or any apoplectic tendency, should not go in at all, or if he does, only for a short period. Drink of all classes is bad, but such drinks as tend to thicken the blood are worse than spirits.

At the Hudson Tunnel the silt was so soft that we pushed the shield without attempting to do any mining in advance, and the material used to flow through the restricted area of the doors at ten times the speed of the advancing shield, when it was filled with wagons and run to tip. The pushing used to take from 10 to 20 minutes, and the ring was erected as soon as the silt was removed by the hydraulic erector.

The St. Clair Tunnel is a very successful completed example of a cast iron lined tunnel, driven by means of shields aided by compressed air. The shield started—one in the United States and one in Canada—in July, 1889, and met under the river in August, 1890, the average speed throughout being about 8 feet per day of completed tunnel at each face. The maximum done in one month by one shield was 382 feet. The material was soft, damp clay, partially fluid, which before the introduction of air-pressure, used to force its way into the shield, necessitating the removal of a greater volume than its displacement. To prevent this, and to guard against an influx of inflammable gas, air pressure was introduced when the tunnels had reached the river banks. A trial heading had some time before been driven out under the river, without the aid of air pressure, several hundred feet and abandoned, owing to the gas met with. The heading was timbered up at the end, and ultimately caused the only serious difficulty experienced. The bulk head, which was built across the end of the

heading, was forced along it by the fluid clay, causing a funnel-shaped opening through the clay to the ballast in the river bed, the hole formed, together with a part of the heading, was filled with the gravel, through which the compressed air escaped freely. The air pressure was increased while at this point to 35 lbs. per square inch, the gravel being smeared the while with wet clay to make it air tight. The air pressure was not generally that due to the hydrostatic head, being usually about 20 lbs., the above pressure of 35 lbs. being the maximum at the time. The outside diameter of the cast-iron lining was 21 feet, and the inside 19 feet 10 inches, the flanges being 7 inches deep, and the metal 2 inches thick at the back. The plates measured 18½ inches along the tunnel, and there were 13 of them, and a key-piece to each ring. The total weight of iron per foot of tunnel was 9333 lbs. The castings comprising the ring were erected by a revolving arm worked by hand, crescented oak packings ¾ inch thick were placed between the planed ends of the castings, canvas packings coated with some resinous compound being used between each ring.

The Blackwall Tunnel is the largest example of cast iron lined tunnel driven by a shield with the aid of compressed air. The work is being carried out for the London County Council, under Mr. Binnie, their chief engineer, Sir Benjamin Baker, being consulting engineer, by Messrs. S. Pearson and Son, of which firm Sir W. D. Pearson, M.P., is the chief. The contract was let in November, 1891, when I was entrusted with the design of the plant and the carrying out of the work by the contractors. Active work was commenced in March, 1892, and Messrs. D. Hay and M. Fitzmaurice were appointed to represent Mr. Binnie as resident engineers upon the work. We commenced operations by sinking the caisson shafts on the Kent side of the river, as the borings showed that there was a thick bed of London clay overlying the tunnel which extended halfway across the river. Caisson No. 4 was the first to be sunk. It is 58 feet 2 inches outside diameter at the bolt, and is 78 feet 6 inches deep. The inside diameter is 48 feet, remaining constant. The outer skin, however, tapers, the thickness of each plate giving a batter of 1 in 100. The space between the inner and outer shells is filled with concrete at 6 to 1, which, together with the weight of the caisson itself, was sufficient to sink it to the bottom. This was not the case with some of the others, which required several thousands of tons added to sink them. The two openings in the side of the shaft through which the tunnel now passes were, during the sinking operations, closed with temporary plating of sufficient strength to resist the maximum head of water that could possibly come upon them, and were built up in pieces 5 feet square, so that they could be removed within and passed through the shield. The plate work was so arranged as to be usable in the remaining caissons for a similar purpose.

Provision was made for an air-tight floor, or deck, above the tunnel openings, so that, should air pressure be required, it could be built into any caisson after it had been sunk in the open as far as possible. The floor was made sufficiently strong to withstand 35 lbs. of air pressure, when loaded with 12 feet of ballast, or its equivalent in water; it has been used on three successive shafts with satisfactory results. It is composed of three systems of girders, two main 12 feet deep and 16 feet apart, nine 4 feet girders and nine 18 inch girders 5 feet apart, all being plate webbed. The two main girders with their maximum load have a reaction of 400 tons at each end, and a great deal of careful design was entailed in order to make the thin skin plating of the caisson equal to such heavy isolated loads. No. 3 caisson was sunk close to the river bank. The wet sand caused great friction, and it was necessary to weight it ultimately to such an extent that 6½ cwt. per square foot of surface was the final frictional resistance. To insure a water-tight bottom to the shafts a light iron floor is put in under the concrete, attached to the caissons by an angle all round.

While Shaft 4 was being sunk the shield was being erected, with a view to saving time, in a kind of dry dock adjoining it, the excavation of which formed part of the cut and cover. Arrangements were made for taking out sufficient of the side of the caisson when sunk to enable the shield to float through the gap, drawing 17 feet of water. Its ends were planked with 4 inch deals and caulked; it was carefully ballasted and kept on an even keel by two 5 ton cranes attached to an overhanging girder on the top. The caisson and dry dock were filled with water until the shield floated, when it was drawn by crabs into place, and lowered with the water as it was pumped out. The filling of the caisson, drawing the shield into it from the dock, and lowering it to the bottom occupied about five days, when it was landed on the cradle of timber and rails, pointing in the direction of the opening in the side of the shaft through which it had to pass on its journey across the Thames. It weighed about 220 tons, and was lowered 60 feet. On the completion of the hydraulic connections and erections, the cast-iron lining was built across the shaft to the opposite side as a reaction for the jacks, and the shield was advanced into the opening upon cast-iron slides. The temporary plating called a plug was removed piece by piece from the face, each plate being replaced by bags of clay, which took the weight of the earth.

As compared with any other shield previously made, that in used at Blackwall is unusually strong, but it has not proved any too strong for the work it has had to do. Its diameter is 27 feet 9½ inches, and it is 19 feet 6 inches long, the outer skin being composed of four thicknesses of ½ inch steel plates, with longitudinal joints, each plate breaking joint and covering the others. There are three horizontal girders with cutting edges, forming air-locked safety compartments. Should there be at any time a blow out of air at the face, and an influx of water, these compartments would always allow of a man's head being in air, though his body would be in water. The face is further sub-divided by one main central vertical, and two short verticals which do not pass through the upper and lower horizontal girders. The face is, therefore, cut up into 12 working pockets, there being, roughly, 14 cube yards per ring to be removed from each floor. The shield is divided into two main divisions, on its vertical diameter, by the centre horizontal girder, which is deeper than the ones above and below, and is attached to an air-tight diaphragm, 9 feet 6 inches from the cutting edge. This arrangement was provided, in case it should be found possible to work with two pressures of air at the face, the diameter of 27 feet making a difference of nearly 13 lbs. per square inch on the air necessary to balance the water head at the top and bottom. Each level is provided with two air locks in the air tight diaphragm, which are so situated that, even should the face of the shield be flooded, there will always be a compartment, air locked, like a diving bell, into which water could not enter.

There are 28 hydraulic jacks, 4 feet stroke with a draw-back cylinder inside the ram, so arranged that all packing can be done without removing the ram itself. The jack valves are worked by two men, but all movements can be controlled by one. There are four groups of jacks, which are arranged about a vertical centre line, each group having a separate valve, and each pair of jacks has a valve to itself. The hydraulic pressure usually used was 2½ tons per square inch. The hydraulic erections, which are a novelty, have proved very efficient, and handle with ease segments which weigh a ton. There are two of them,

The Exploration Company, as London agents of the Consolidated Deep Levels (Limited), have received the following cable from Johannesburg:—"The directors authorize a dividend of 20 per cent. Shareholders registered at June 8. Dividends will be closed June 9, to be opened again June 10."

ANCIENT MINING.*

WITH ESPECIAL REFERENCE TO THAT
CARRIED ON IN GREAT BRITAIN.

By A. COOPER KEY (Student).

(Continued from page 627.)

THERE were silver mines as well as tin mines at Thamusis, and, in the 13th century B.C., the Phœnicians opened out the gold treasures of Thasos, an island in the Thracian Sea. Herodotus, who viewed these mines after they had been abandoned, informs us that the miners had turned over a whole mountain. Travelling on, the Phœnicians explored Sardinia, and, it is believed, worked lead there; for, in the vicinity of the lead mines, enormous heaps of scorified ore, and pigs of the metal have been found buried in them, dissimilar to those of Roman manufacture. The weight of these pigs is about 28 to 30 lbs. Some of them are of lead, and others of copper. Still pursuing their western course, these early miners reached Spain, a country of overwhelming mineral wealth. Some writers have drawn a parallel between Spain and America, saying that the former country was to the ancients what the latter is to us; but Professor Rawlinson, in following out the same idea, goes farther than this, for he says: "Spain was the Peru of the ancient world; in fact, it surpassed its modern rival, for it not only produced gold and silver, but copper, iron, lead, and tin in addition." They attacked the silver mountain, i.e., Sierra Morena, which is situated near the lower course of the River Guadalquivir. The richest mines of silver were near Siphia, the site of which has been located with modern Siphia. Gold was the least abundant metal; it occurred in the bed of the Tagus, and there were mines for it in Galicia, in Asturias, and elsewhere. There was always some silver mixed with the gold, the proportion varying from 3 per cent. to no less than 12½ per cent. Copper was found at Cotini, which is situated near Gades—the modern Cadix. Tin was not found near the surface, but was mined in Lusitania, to the north of Lusitania, and in Galicia. Lead was yielded in greater abundance, and was found in Cantabria, in Bœtica, and many other localities; and it was exported by the Phœnicians, the Carthaginians, and Romans. It is thought that the discovery of silver was accidental, and in consequence of the burning of a large forest, which caused the metalliferous material to melt, and the silver was found in lumps on the ground.

When the Phœnicians first landed in Spain, silver was regarded as of little account by the natives, and they were able to exchange articles of little value for large quantities of it. The mines in Iberia were carried down many stadia in depth, with pits, shafts, and sloping paths. It was found that the veins of gold and silver were more productive at great depths. The metallurgical processes adopted are interesting, but details of them are wanting. The gold ore was melted over a slow fire, and purified by volatilized earth. In a method pursued in somewhat later times the ore was crushed and washed carefully until the earth was cleared away, and only the gold remained. After washing, the pulp containing the grains of metal were put into white clay crucibles which were placed in a furnace heated to melting point, which temperature was attained by the aid of a blast produced by bellows. Dross or skim forming on the top of the mass was skimmed off, or the metal run off by opening a stop cock. In order to obtain a metal of greater purity, the melting process was sometimes repeated. The slag from gold was, as a general practice, crushed and treated again so as to obtain as much gold as possible. Some gold, however, always remained in the dross, as the ancient metallurgists were unacquainted with the use of mercury, although they were aware of its existence in Spain. Silver was dealt with in smelting, the chimneys of which were carried high up into the air, so the fumes which were given off were dangerous, or even deadly. This was due to the presence of arsenic in the ore and also slag to a lesser degree of antimony.

According to Diodorus Siculus, the shafts sunk by the Phœnicians were, in some cases, half a mile or more in depth. From these shafts horizontal levels or adits at various levels were constructed; then from these main levels sprang lateral galleries, either straight or very crooked. The veins were perseveringly followed, and when a trap fault was encountered it was cut through or the road turned. The danger to the miners from falls of the roof was well understood, and it was customary to support it by means of wooden posts. Where the rock was sufficiently strong to allow of it the road was arched to give additional strength. Strong springs of water were very often struck, in which case the mines were drained by making a new adit to a lower level; where this was impracticable the workings had to be abandoned; but by the invention of the screw pump of Archimedes, about B.C. 220, it was possible to pump the water to the surface. There is good authority for saying that this method of drawing water was, as late as 1811, used both in Spain and Portugal.

Nearly all the tin used by the ancients was procured by the Phœnicians from the Cassiterides. A great deal of speculation has been indulged in as to their position, and many authors have been at great pains to endeavour to prove that they were situated to the east of Phœnicia in the neighbourhood of India. The great weight of evidence and the testimony of the most learned archaeologists is, however, that they corresponded to the Scilly Isles and Channel Islands, and, more particularly, Cornwall, which was in those days supposed to be separated from the mainland. Two derivations have been suggested for this word Cassiterides, but they may be independent or, in reality, one. "Kassiteros" is the Greek word for tin; but possibly this is the equivalent of the Hebrew word "katsch" "katsch," meaning the extremity of the earth, which the coasts of Britain would have been to the ancients. The Phœnicians had an important station at Gades or Gadir (the present Cadix), which was built in the year 1100 B.C. Here they made boats, and had repairing shops. The word "Tharsish," of such frequent occurrence in the Pentateuch, is considered to refer generally to the coasts of the Mediterranean.

From Gades these ancient sailors voyaged to Cornwall, a distance of about 1000 miles in a direct line, but considerably further by keeping nearer the coast line, the route which they probably adopted. It is believed that the communication between the two places was, in the earlier days, by sea through-out; not, as in later times, to some port in the north of Gaul, and thence across the mainland. To have performed this rough passage, the Phœnicians must have possessed large seaworthy boats, very different, indeed, to the small coracles used by the Britons. The commencement of the Phœnician working in these islands has been assigned as about 12 centuries B.C. Diodorus Siculus, writing just before the Christian era, and repeating what had been told by more ancient chroniclers, gives an account of the work of the inhabitants of the west of

Britain, says—"They prepare the tin, very carefully working the earth which produces it; the ground is rocky, but has in it earthy veins, the produce of which is brought down and melted and purified. Then, when they have cast it into the form of cubes, they carry it to a certain island called Iklis. During the recess of the tide the intervening space is left dry, and they carry over abundances of tin to this place in their carts."

Regarding the position of the island Iklis, various theories have been advanced, some authors even going so far as to suggest an identity with the Isle of Wight. This seems exceedingly problematical, and would appear to fail when the great distance for transport by carts is considered. The most reasonable view to take is that it corresponded with St. Michael's Mount. It is stated that the carts are run over at low water, and many of you doubtless know that St. Michael's is at this day severed from the mainland at high water, the causeway connecting them being covered at that state of the tide. The Phœnicians were not Jews, but Canaanites, worshippers of Baal and Ashtoreth. Possibly they employed Jews as their slaves. The "Jews' houses" of Cornwall are of a much later era (Saxon and Norman times). Truro Museum contains a bronze casting of a bull about 2 inches in height, with many distinguishing features of Assyrian bronzes. Moreover, a similar figure has been discovered in Babylon.

In 1849 Mr. Richard Edmonds discovered near Marazi a vessel resting on charcoal ashes, charcoal and slag being also associated. This was conjectured to be the remains of an ancient bronze furnace, but Professor Hunt is of opinion that it was only used for domestic purposes, on account of the action of the molten tin upon a vessel containing copper in its composition, which would be disastrous to the vessel. The tin worked was probably of detrital or alluvial origin. The Phœnician jealousy endeavoured to keep the tin trade to themselves, and for some centuries they maintained the monopoly. Even the Gauls, the near neighbours of the Britons, were unacquainted with the riches of the Cassiterides. So carefully and prudently was the situation of the tin islands kept secret that, in order that a rival nation should not become aware of a safe passage to them, a Phœnician ship, which was being pursued by the Romans, was purposely run upon the rocks by her captain. Compensation was made to the owners for the loss of the ship and her cargo by the Phœnician Treasury. The diligent Greek historian, Herodotus, was unable to find out the real position of the Cassiterides, and only knew that they were beyond Gades. This is a proof not only of the advantages and profits derived from the trading in tin, but of the secrecy with which that trade was conducted.

It seems uncertain how long the Phœnicians were masters of the situation, but it was probably during a period of about 300 to 400 years. At the end of this time the whereabouts of the Tin Islands were at last discovered by the other nations, and the Romans, Greeks, and Gauls then came in to work the mines. The word "Melcarthus" is associated with the Phœnician discovery of Britain in writings of 1000 years B.C., but it is doubtful whether it actually referred to the discoverer of these islands or to a deity worshipped at Gades. Some writers are of opinion that the Phœnicians visited the Baltic for the purpose of obtaining amber, which is thrown up in quantity by the waters of that landlocked sea. It has further been suggested that they were sailing in search of amber when they discovered the British Islands.

4. Subsequent Continental Mining Operations.—The Carthaginians succeeded the Phœnicians in the working of the Spanish mines, and, from the riches derived from them, became a very wealthy nation, enabling them to hire soldiers and to conduct heavy wars.

Evidences of Carthaginian occupation are afforded in the names of some Spanish towns, e.g., Carthago. In Spain, in the shops of Malaga, Moorish, Roman, and even Phœnician coins, were current as recently as 1863. Slave labour was universally adopted, and these wretched beings were kept all day and all night in the murky and fetid atmosphere of the mines. At one time the Romans employed—or used is, perhaps, a more appropriate word—40,000 slaves in the silver mines near Carthago. Professor Rawlinson is of opinion that the Romans, Phœnicians, and Carthaginians all used slave labour, but, on the other hand, it is mentioned by Diodorus Siculus that the workmen received one-fourth part of the produce of the mine under the early Phœnician régime, which would be a very liberal wage.

(To be continued.)

NOTE ON MR. HOWE'S RESEARCHES ON THE
HARDENING OF STEEL.*

By F. OSMOND, Paris.

I HAVE read and studied with great pleasure the work of Mr. Howe. The author, with complete mastery of his subject, has chosen the best experimental conditions for arriving at conclusive results, and he has succeeded, where others have failed, in demonstrating the complexity of the phenomena of hardening, and in connecting the critical points of soft steels with the variations in their mechanical properties.

The critical portion of his paper is a model of lucidity, logic, and equity. It is true that certain divergences of opinion may still remain; but the work, as a whole, presents such an imposing front that observations on points of detail run the risk of appearing trifling. It is preferable to accept Mr. Howe's arguments as a faithful exposition of the respective positions of current theories. On this basis an endeavour may be made to ascertain how far the allotrophic theory can, by the natural development of the consequences to which its principal leads, remove the objections which might justly have been urged against it in its primitive form.

When the allotrophic theory was originated it seemed well, for the sake of simplicity and in the absence of decisive adverse reasons, to unite and consider as parts of a single phenomenon the two points a_1 and a_2 . But these two points became definitively separated directly it was shown that one only of them, a_1 , coincides, to the exclusion of the other, with the appearance or disappearance of magnetism in iron. From that time it was necessary to distinguish at least three molecular states of iron, which were respectively stable within certain intervals of temperature; a below 700° , b between a range of 750° to 800° ; c above 860° .

If it is now possible, by suitable devices, to preserve at the ordinary temperature the two forms of iron which are not usually and naturally found in equilibrium, we may expect to find, among the innumerable varieties of steel, three general and well distinct types in which a , b , or c dominate respectively, and assert their presence.

Further, it appears easy to show that these three types of steel really exist, and that they well represent the existence of

* Paper read before the Iron and Steel Institute.

† It may be well to recall the fact that the experiments of Dr. Ball (Journal of the Iron and Steel Institute, 1890, No. 1, p. 88) indicate the possible existence of a new critical point near 1500° .

each of these forms of iron, independently of the means employed to maintain the forms distinct.

Consider the case of iron alloyed with elements of small atomic volume. We know that, in accordance with Roberts-Austen's law, which has been verified by experiment, such elements lower, and even go far to suppress the points of transformation; and among these elements there are three—carbon, nickel, and manganese—which play a most important part in metallurgy, and concerning which there is much documentary evidence, published or otherwise.

Only it is necessary to compare comparable things. Of the three elements under consideration, there is one—carbon—which has the property of forming during the slow cooling of iron a definite compound with iron, capable of isolating itself in the mass. With nickel and manganese, which remain active, we cannot compare the inert carbon, which is isolated under the form of a carbide of iron, but only the carbon, the activity of which quenching preserves, although we do not know exactly its true nature. In other words (and it is a necessity which is constantly ignored), only hardened carbon steels can legitimately be brought in line with the manganese steels or nickel steels; and the annealed carbon steels should, therefore, be deliberately set aside, paradoxical as it may seem to those metallurgists who think that different metals can be made comparable by subjecting them to identical treatment, not recognising that they often thereby obtain precisely the contrary results.

Let us then arrange continuously, in three parallel series, nickel, manganese, or active carbon, and see how the critical points and the essential physical properties may be correlated.

Nickel Steels.—The case of nickel is really the most simple, because nickel steels poor in carbon can be obtained, and because we owe, more especially to the researches, always so methodical and so useful, of Mr. Hadfield,* and to those of the Compagnie des Acieries de St. Etienne, series of very suitable specimens in which the amount of carbon present is very small.

In this series the tensile strength of annealed test pieces rises progressively with the amount of nickel, while the extensibility correspondingly decreases.

Between about 10 (or 12) and 24 per cent. of nickel the tenacity remains near a maximum, and the ductility at a minimum. Then, near 25 per cent. of nickel, the resistance is lowered and the extensibility is increased.

The series may, therefore, be subdivided into three groups. In the first, the critical points, which are at the outset separated, reunite and become progressively lowered, and occur between 500° and 515° in the case of steel with 7.65 of nickel; the hardness to the file (except perhaps that of the extreme members of the series, which I do not possess) does not appear to differ from the hardness of ordinary steels, and (with the same reservation) short bars do not appear to be permanently magnetic.

In the second group the point of transformation falls below 350° or 400° . In the case of 15.48 per cent. of nickel it falls to 130° or even to 120° , and with 19.64 per cent. of nickel it falls to between 85° and 65° . The transformation in the case of steel with 24.51 per cent. of nickel is incomplete even at the ordinary temperature. At the same time the hardness increases greatly; and although the hardness of quenched high carbon steels is not attained, it is practically very difficult to work this variety of steel with tools, and short bars are permanently magnetic. It is easy to show that the point at which hardness is acquired coincides with the evolution of heat during cooling.

With about 25 per cent. of nickel or a little more, no critical point can be observed during slow cooling: the mineralogical hardness is slight, working with tools is possible, if not easy, and the metal is practically non magnetic.

It is, moreover, easy to see that in the series of St. Etienne steels the tensile strength varies inversely as the percentage of carbon in the case of metals with 25 per cent. of nickel which have been either annealed or quenched in water. In the series with 15 per cent. of nickel, the tensile strength, after having increased simultaneously with the carbon, then diminishes rapidly, as successive additions of carbon are made.

Manganese Steels.—As regards these steels the results are not so clear and are less conclusive, for we do not possess a regular series of them with a small percentage of carbon, and it is impossible, therefore, in each particular case to apportion the influence which is exerted respectively by carbon and by manganese. It is, however, known that up to about 3.50 per cent. of manganese, typical properties—that is to say, mineralogical hardness and magnetic qualities—do not appear to undergo any radical change. The iron alloys with the above proportion of manganese have critical points above 400° .

With about 3.50 per cent. of manganese, steels are met with which may be made either hard or soft at will. I am indebted to Mr. Hadfield for a specimen containing, C = 0.30, Si = 0.18, Mn = 3.25 (or 3.89 according to another analysis). This metal, which I received in the form of a small forged bar, was found to be very hard. After heating to a temperature of 800° , and allowing it to cool spontaneously in a Leclercq and Forquignon furnace, treatment which revealed the existence of a critical point at about 400° , it was softened, but still remained fairly hard. After heating a second time (in this instance up to 1000°), and cooling it under the same conditions, when the critical point proved to be at 425° , it became soft enough to file readily.

With between 3.50 or 7 per cent. of manganese, steels are obtained which, when slowly cooled, scratch glass and become permanent magnets, their point of transformation then being lowered below 400° . I may cite, as examples, two specimens which have also been furnished me by Mr. Hadfield (together with their analyses) which contain respectively—

	Carbon.	Silicon.	Manganese.
No. 34	0.45 ..	0.11 ..	4.00
No. 32	0.32 ..	0.26 ..	5.04
			6.31

No. 34 has its point of transformation between 300° and 200° , and that of No. 32 is below 100° .

* Comptes Rendus de l'Académie des Sciences.

(To be continued.)

THE SICILIAN SULPHUR INDUSTRY.—One of the chief questions now engaging the attention of the Italian Government is that of the amelioration of the sulphur industry of Sicily, which is at present in a very depressed condition, owing to the competition of pyrites for the production of sulphuric acid, and the fact that the supply now largely exceeds the demand, not to mention the threatened rivalry of Japanese sulphur. The price has fallen from 140 lire to 60 lire per ton. It is now proposed to abolish the export duty of 20 per cent, which formerly yielded an annual revenue of 3,400,000 lire. In order to make good the deficit thus caused to the revenue, it is proposed to levy a tax of 1 lire per ton on sulphur exported from Sicily, to increase the import duty on barley and white maize from 1.15 lire to 4 lire, and to introduce a statistical fee ranging from 10 centimes per quintal to 10 centimes per ton on imported goods not specified in the treaties of commerce.

A dividend of 6d. per share has been declared, payable on June 8, to shareholders in the VICTORIA GOLD MINING ASSOCIATION (Charted Towers).

—THE OUBO PRETO GOLD MINES OF BRAZIL (LIMITED) has sold the March gold for £5778 16s. 1d.

* Paper read before the first Students' Meeting of the Institute of Mining and Metallurgy.

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THE REGISTERED OFFICE of this Company has been
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House, Old Broad Street, E.C., and Mr. John Jameson Truman
has been appointed London Secretary.

By Order,
J. JAMESON TRUMAN,
London Secretary.

May 19, 1896.

DIARY.

Tuesday, May 26.
Crown Reef, Johannesburg, 11.

Wednesday, May 27.
Prospectors' Association, Winchester House, 12.
Bamboo Queen and Reward Mines, Winchester House, 12.30.
Blackett's Claim Gold Mining Co., Winchester House, 2.
United Australian Exploration, Cannon-street Hotel, 2.
Thursday, May 28.

Polberro Mine Company, 37, Walbrook, 11.
London, Scottish, and American Trust, Cannon-st. Hotel, 11.
Red, White, and Blue Gold Mining Co., Winchester Ho., 2.30.
San Sebastian Nitrate Company, Winchester House, 2.30.
Golden Feather, Winchester House, 3.

Friday, May 29.
Lionsdale Estates (Limited), Winchester House, 12.
Elandsfontein No. 2 Gold Mining Co., Winchester Ho., 12.30.
Nobel's Dynamite, Winchester House, 1.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

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LONDON: MAY 23, 1896.

WITWATERSRAND AS A GOLD PRODUCER.

THE report of the Witwatersrand Chamber of Mines for
the year 1895 has just reached us. Though its salient
figures have, of course, been known for some time, they
are, nevertheless, brought more vividly before us, when we have
an opportunity of analysing the various items, and of com-
paring them with previous years' results. It is simply impos-
sible to look at the output of the Witwatersrand without
being struck afresh each time by the wonderful producing
power of this small area. For, after all, on the most liberal
interpretation, the area covered by the productive Rand
claims, including even the deep levels, is only some 250 square
miles, and its output for last year was 2,277,640 ounces, worth,
it is calculated, £7,840,780 sterling. We know that last year
was by no means a satisfactory year as far as work was con-
cerned. The various political troubles that have since come to
a head were even then in the air, for JAMESON'S memorable
march had begun even before the year, of which we are now
studying the record, had ended. Whatever the merits of the
questions involved, it is clear that a good number of the leading
citizens of Johannesburg, connected more or less closely with the
gold industry, were not thinking solely of mining and milling
during the latter half, at any rate, of 1895, and it cannot but
have been that the partial division of their interests was
the cause of more or less slackness in their subordinates.

This much may be taken for granted, and it would well enough
account for returns being less than they would have been under
more peaceful circumstances.

From the report we see that the total number of natives
employed on the Rand is put down at over 50,000, whilst
it is estimated that the number required to keep the
mines in full swing is 60,000. This is a large number to
be concentrated in one small area, in so sparsely populated
a country as South Africa, and there is no wonder that a con-
siderable space in the report is devoted to the native labour
question, which is, no doubt, one of the most formidable diffi-
culties that has to be met. The recent outbreak in Matabele-
land shows what the raw material is like, and that habits of
steady industry have not yet taken the place of the savage in-
stincts of the South African native. Nor is it to be expected
that so radical a change could be worked in a few years; it
will take generations before the indolent, undisciplined Kaffir is
broken in to the steady work that is desired of him. We
wonder, by the way, that the attempt to import Chinese labour
has never been made. Australia and America can bear witness
what an excellent gold miner John Chinaman makes, and there
would be no difficulty in importing 10,000 men direct from
China to the Rand. At any rate, the experiment is worth a
trial, and if properly handled we have no doubt as to the result.
The labour question has got to be threshed out, and as far as
last year is concerned, it seems certain that scarcity of native
labour was a main factor in the retardation of gold mining,
and in the diminution in the rate of increase which has hitherto
been maintained.

But even as it is, the production of over £7,840,000 from this
small patch of land is unprecedented in the history of gold
mining. There is nothing to compare it to, because it so far
exceeds any other mining district of approximately equal
size with it, and we actually find it necessary to institute
comparisons between this insignificant patch of land
and whole continents. The total output of Australasia
exceeds that of the Rand, but not by much, and that
of the whole of the United States of North America is only
about half as much again. California and Colorado, the two
leading gold-producing states of the Union, whose output in
1895 was one-third more than it was in 1894, fall far short;
together of the Rand output. The Indian gold mines are in a
flourishing condition, and Mysore takes high rank amongst the
gold fields of the world; yet their output in 1895 was only about
240,000 ounces worth roughly some £922,000. Yet these are highly
valuable and important fields, and can compare favourably with
most others in the world. Indeed, there are few roofing districts
that can be named to equal Mysore, and it is because they
occupy so eminent a position that we have chosen them for com-
parison with the Rand, and yet, as we see, their output is less than
one-eighth of the latter. This same point is brought out promi-
nently once again when we turn to Australia. The full re-
ports for 1895 for all the colonies are not to hand; the output of
Queensland will probably not be very far short of 700,000 ounces,
worth, let us say, £2,400,000, or less than a third of what the
Rand has done, yet Queensland is the leading gold producer in
Australasia.

Western Australia is just now being boomed with all
the energy that the Stock Exchange is capable of, and
fortunately its last year's returns are available. These are
just a little less than those of the Mysore district—namely,
231,500 ounces, worth £880,000, say about one-ninth of the
value of the Rand output; the relative area of the two gold
fields may be imagined from the statement that the area of the
Rand gold fields is little over twice that of the county of
London, whilst the area of the West Australian gold fields is
considerably over twice that of Great Britain. It is, of course,
quite true that Western Australia is in so far a newer gold field
than Witwatersrand, because it did not come into any promi-
nence as a producer till about 1892. In 1887, it produced only
4870 ounces of gold, whilst in the same year the Rand produced
23,125 ounces. They commenced their careers as producers
together, but the compactness of the Rand area and the almost
unique character of its deposits have been immensely in its
favour.

The biggest producer on the Rand is the Robinson Mine, with
a year's production of 157,207 ounces, valued at £668,000, whilst
several others, such as Langlaagte Estate, New Primrose, Crown
Reef, &c., run it pretty close. There are, altogether, five mines
on the Rand whose output was over 100,000 ounces in 1895;
the joint output of any two of these mines is greater than the
entire output of the whole of Western Australia. It is only
by means of comparisons such as these that the stupendous
producing power of the Rand can be fairly grasped. To attempt
to understand these enormous figures without comparing them
to other smaller ones is an all but hopeless task, and there are
many reasons why those interested in mining, and in fact all
Englishmen should desire at this juncture to get a clear con-
ception of what the gold output of the Rand really means.

Not only does Witwatersrand hold a unique place because of
the nature and importance of its deposits, but these have also given
rise to a unique system of gold extraction, which we find described
in the current report of the Chamber of Mines. We refer to
the process used at the George and May mines, a process which
we commented on as far back as the middle of last year. This
ore was at first treated by the usual Witwatersrand method—
stamp mill amalgamation followed by cyaniding of the tailings.
The ore assayed 9 dwts. 15 grains; the yield in the mill was
3 dwts. 19 grains, and by cyanide treatment 2 dwts. 18 grains,
or a total of 6 dwts. 14 grains, equal to a total extraction of
67.5 per cent., but as only 60 per cent. of the tailings could be
treated it was really only an extraction of 55.8 per cent. This
poor result led to an attempt to treat the poorer decomposed
ore of the outcrop by direct cyanidation, without any previous
amalgamation. The ore as mined is screened, the coarse going
through a Gate's crusher, and the mixed screenings and crushed
ore are trammed direct to the cyanide vats and treated in the
usual way. Four solutions ranging from 0.23 to 0.05 per cent.
of cyanide are used, and a final wash with clean water given, the

whole process taking 60 hours. The assay of the ore before treatment was about 5 dwts., and the extraction was 4 dwts. per ton, or 80 per cent.; a month's run gave an assay of 5 dwts. 6 grains, and extraction 4 dwts., or 76·2 per cent. It is obvious that the total extraction is better when amalgamation is omitted, because during the process of amalgamation, a large proportion of slimes is necessarily produced, and these slimes, which are untreatable by the cyanide process, carry off locked up in them a large amount of float gold. The cyanide process is known to be unsuitable to the treatment of ores which contain the bulk of their riches in the form of coarse gold, just as amalgamation in the stamp mill is an unsatisfactory method for treating ores that carry gold in a state of extremely fine division. How fine such gold must be before it is unsuitable for the stamp mill may be judged from the fact that very satisfactory stamp mill amalgamation has been performed on ore, the average diameter of the gold particles in which was only 1·250 of an inch. The successful results obtained at the George and May Company by the practical application of these principles would seem to point the way in which future improvements in gold milling may be expected. As depth is attained in gold mining, it seems that the character of the ore, all the world over, is gradually undergoing a change, inasmuch as coarse gold is becoming more and more scarce, and finely disseminated gold is apt to prevail. Under these circumstances it is quite possible that instead of using the cyanide process as an aid to amalgamation, gold miners will be compelled to use amalgamation merely as an adjunct to the cyanide process. The Rand was the cradle of the last-named process, and it is satisfactory to find that in one mine, at any rate, it has come to its full growth, and is able to stand alone.

There are many other points of interest in this report of the Chamber of Mines, which we would like to refer to if space permitted. Though it is throughout written in a studiously neutral tone, the Governmental difficulties by which the mining industry that centres around Johannesburg is hampered, are none the less clearly evident. Such matters as dynamite and cyanide monopolies, defective regulations for natives, taxes on coal, and numerous others have been discussed, and their bearing upon the success of gold mining is pretty evident. When a Chamber of Mines has repeatedly to petition the Government of a country that only lives by mining, on such subjects it can hardly be seriously maintained that there are no grievances to redress. The wealth that is being produced by the mining operations of the Rand is, as we have shown, enormous; how much greater it might be if existing restrictions were removed, it is hard to say. When a little patch of land like this has been capable of turning out nearly 9,000,000 ounces of gold—say, close on £20,000,000 sterling—within nine years, and when the very idea of exhaustion is not yet even mooted (in fact, when all researches show that the supply of precious metal is even vaster than was supposed by the most sanguine), it is, indeed, difficult to see where the limit of production is to be reached. And, surely, the men who have produced, and only ask to be allowed to go on quietly producing, such an addition to the world's wealth deserve recognition, encouragement, and support. It is not so very long since the phrase "unearned increment" was continually in the mouths of certain political economists—with very strong accent on the political; if ever there was a true instance of unearned increment, it is assuredly in the revenue of this Boer Republic and the wealth of those Boer officials, who would, if existent at all, be in the last stages of pauperdom, were it not for the energy and enterprise of the oppressed Outlander, without whom Johannesburg would be non-existent, and the Witwatersrand the same barren, worthless veldt that it was till within the last 10 years. But neither the Witwatersrand mines nor Johannesburg itself are such testimonials to the industry and energy of the men who have created them, as is this annual report of the Chamber of Mines, a report that may well vie in completeness and accuracy with the similar productions of any Government, our own not excepted.

WATCH-DOGS NOT BLOODHOUNDS.

THE commerce of this country has been built up on trust and confidence. The assumption of innocence until the contrary is proved is the very foundation of our law, even when applied to the criminal classes. Cases every now and then undoubtedly arise which disclose such an abuse of the privileges which these high principles afford, as for a time at least, to shake the belief in their convenience and necessity. An illustration of this has been of recent years afforded by what are now known as the BALFOUR frauds. The Companies Act of 1862 supplied an opening to thousands of persons to invest their money in trade, and trading concerns, with comparative security that they would be able to reckon upon the cost. The great majority of businesses into which the public have embarked, relying upon the integrity of mankind in trade, in the long run proved to be honest, and the public has, consequently, further largely availed itself of the temptation and the opportunity. But the rule has at last been proved by the exception, and among the many virtuous appeared the rogues. The commercial confidence was shaken. The people appealed to the Courts to punish those who have been the instruments in this disaster, and to declare and define the limits and bounds which are to govern commercial morality.

It thus comes about that Mr. Justice VAUGHAN WILLIAMS has been called upon to decide the responsibility attaching to those who, by their conduct, have seemed to have been implicated in violating the rules of honest trade. In determining particular cases it has been necessary for him to lay down with reference to certain classes of persons broad and general principles of duty; and thus as a kind of high priest in business morals he has declared to auditors their duty. It would be less than natural were the priest in no way influenced by the feeling of the world in which he lived. The temptation is obvious to become a strict disciplinarian,

and it, therefore, is not surprising if Mr. Justice VAUGHAN WILLIAMS should, catching the humour of the hour, over-state the duties of auditors. The Kingston Cotton Mill Company yearly issued balance-sheets, signed by its auditors, which were issued by the directors to the shareholders. An Act of Parliament passed in 1879 required of auditors of public companies that they should report to the members on the accounts examined by them, and on every balance-sheet laid before the company in general meeting, and whether, in their opinion, the balance-sheet referred to in the report is a full and fair balance-sheet, properly drawn up, so as to exhibit a true and correct view of the state of the company's affairs, as shown by the books of the company. It appeared that the auditors, relying on the certificate of the managing director, over-stated in the balance-sheets for several years the value of the stock-in-trade. This statement was deliberately false to the knowledge of the managing director, but the auditors believed it, and dividends were paid on the footing that the statement was correct. In the balance-sheet the auditors were careful to point out that they did not hold themselves responsible for the value of the stock-in-trade by stating that the value was "per the manager's certificate." Mr. Justice VAUGHAN WILLIAMS held they were not entitled to rely upon such certificate if an ordinary careful examination ought to have made them suspect that statement. The auditors took the value of the stock-in-trade from the stock journal, which was summarised and signed by the manager. The auditors trusted to the manager for the stock-in-trade in hand. Had they not done so, from other books which showed the quantity of stock bought and sold during the year they could have found that the stock in hand at the end of the year ought to be much less than the quantity shown in the stock journal, so much so that it must have excited suspicion. Under these circumstances, that learned judge was of opinion that the auditors had been wanting in the execution of their duty, and were responsible to repay to the company the moneys improperly paid as dividends by reason thereof. With this conclusion the Court of Appeal—consisting of Lords Justices LINDLEY, LOPES, and KAY—by an unanimous decision last Tuesday has thought fit to disagree. The learned judge and the Court of Appeal all agreed that it is no part of the duty of the auditor to take stock. But the one thinks it is the duty of the auditor to test the accuracy of the manager's certificate by a comparison of the figures in the books that require auditing; whereas the other is of the contrary opinion.

What, then, is the duty of the auditor? It is to ascertain the true financial position at the time of audit, by examining the books, taking reasonable care to ascertain that they show the true position. Having done this he has to frame a balance-sheet, showing that position according to the books, and to certify that the balance-sheet is correct in that sense. In doing this he is only required to exercise reasonable care and skill in making enquiry and investigations. He does not guarantee that the balance-sheet is accurate according to the books of the company, far less is he an insurer; nor does he guarantee that the books correctly show the true position of the company's affairs. Then comes the question what is reasonable care. That is a matter which must depend upon the circumstances of the case. The auditor must be honest, and where there is nothing to excite suspicion very little enquiry will be sufficient. More care will be required in cases of suspicion, but even then he is not bound to do more than exercise reasonable care and skill. He is not bound to be a detective or to approach his work with suspicion, or with a foregone conclusion that there is something wrong. As Lord Justice LOPES said on Tuesday last, "he is a watch-dog, but not a bloodhound." That learned judge added, "the duties of auditors must not be rendered too onerous. Their work is responsible and laborious, and the remuneration moderate."

With the general view expressed by the Court of Appeal, that an auditor is not to be a detective in the sense of approaching accounts with suspicion of fraud, we are disposed to agree, yet at the same time we are still inclined to sympathise with the view of Mr. Justice VAUGHAN WILLIAMS that, where the auditor has to take a statement on trust, such as the value of stock in hand, the accuracy of which can be tested by a comparison of figures in the books which he has to audit, it is his duty to check that statement, and if the result is to question the statement, and to raise suspicion, then, on the principles laid down by the Court of Appeal, he would have to enquire further. We fail for our own part to see that in this the auditor would be exceeding the limits of that character in which we are content to know him—namely, a good watch-dog. We have no desire that he should start his audit in the spirit of a hound smelling for blood.

NOTES AND COMMENTS.

We publish to-day an abstract of a leading article on the "Rigaud Total Gold Extraction" process, which we have taken from the *Credit National* of Paris, this paper devoting an illustrated special number to an account of the process and the works now finished at Tancerville. This supplement consists, in great part, of a repetition of the previous article upon M. De Rigaud's process, a full abstract of which we have already presented to our readers. It concludes, however, with a short article by the editor of the paper on the financial results to be obtained from the process; this article declares that the tailings of the world contains 27,000,000 francs worth of gold, the whole of which is to be extracted by the Total Gold Extraction Company with a clear profit of one half this amount. We do not know how these figures have been arrived at. One of the standard authorities on the production of the precious metals is the Director of the United States Mint. He makes out that since 1792 the total gold output of the world has been about 400,000,000 sterling; and when we remember that no gold was

produced in the United States, Australia, or the Transvaal before that time, that practically all gold produced before then, and the larger proportion since then is derived, not from quartz crushing, but from alluvial, it cannot be admitted that tailings exist containing over 100,000,000 sterling. There is a significant sentence in the last report of the Johannesburg Chamber of Mines to the effect that the accumulated tailings of the Rand have been practically all exhausted. There are other statements in this supplement that ought not to be passed over without remark, especially as they are repetitions of the statements that existed in the previous article, and can, therefore, not be set down as misprints or clerical errors. Working expenses of the cyanide process on the Rand are, in many cases, estimated to be not 4s., but 2s. per ton, and the time occupied is nearer three days than 30. How anyone can repeatedly write that the chloride of barium, cupric and ferric chlorides, chloride of lithium, chloride of nickel, and one or two others are insoluble in water is a mystery to us. Finally, we must be distinctly understood as expressing no opinion whatever on the process and its merits. We merely lay before our readers what is being said and done about a novel metallurgical process, and leave them to form their own opinions on the subject.

THE Randfontein Estates, one of the Robinson group, has just passed through a wonderfully successful year, in every way realising our prognostications of a year ago. The company owned, as is well known, a vast and very rich mining property, upon a small portion of which, 12 months ago, it was itself working, not without most encouraging results. But, apart from these mining operations, the chief profits of the company were to accrue from the sale of portions of its immense property to other companies. During the year several subsidiary companies have been formed, and already they have succeeded in accomplishing work which augurs most hopefully for the future. The first company to be formed was the Porges-Randfontein Gold Mining Company, which took over the mine of the Randfontein Estates. The capital of the company is £500,000, in £1 shares, of which 350,000 fully paid-up shares were paid to the parent company for the lease of the mine, and the machinery and plant. The next operation was the sale of six claims to the North Randfontein Gold Mining Company for 6000 shares. The whole of the line of reef for a distance of 3000 feet has been traced, and the property opened up to the second level. The mine has been fully equipped with the most modern machinery, a battery of 60 stamps is in course of erection, and milling is to be started at an early date. This company adjoins the Porges Company to the north, and the reef throughout the property is said to be well defined, with an average width of 6 inches, and assaying from 1 to 20 ounces per ton.

The next transaction was the sale of 172 claims on the far Utralfontein, adjoining the North Randfontein, to the Robinson Randfontein, for 375,000 fully paid-up £1 shares. The capital of this company is £800,000, of which £70,000 is working capital. The reef in this property has been traced throughout its whole length—namely, 3150 feet, and the first level has been opened over a distance of 2200 feet. We are told that the machinery is on order, and that work is being pushed forward vigorously. The reef exposed has a width of 6 inches, and assays as high as 62 ounces to the ton have been obtained. Since the formation of the Robinson Randfontein, however, it was found that as the reef extended for over 6000 feet along the strike, it was capable of being worked by more than one company to advantage. The result was that a portion has been sold to the Block A Randfontein Gold Mining Company for 400,000 shares. By the recent acquisition of the outcrop claims the Block A company has also the reef running through the length of the property some 3000 feet, and various assays have given as high as from 2 to 5 ounces to the ton. Following the flotation of the Robinson Randfontein the reef was traced in the adjoining mynpacht, and, therefore, a company was formed to take up this, called the Mynpacht Randfontein Gold Mining Company, with a capital of £750,000. For its rights in this company the Randfontein Estates obtained 500,000 fully paid shares. On this mynpacht the reef has been located by means of a bore hole, and assays as high as 5 ounces 4 dwts. to the ton have been obtained. Altogether the Randfontein Estates has disposed of 624 claims, for which a total of 1,483,500 shares have been received, which at present market prices represent a sum of £2,500,000.

ALMOST the only sentiment with which the sentences upon the Reform leaders were received in London was one of incredulity that they would ever be carried into effect. This view has been strengthened by time, and further supported by the cablegrams received through the British agents. There could hardly be, from the Boer point of view, any reasons which could impel them to exert the utmost rigour in dealing with the prisoners. The heads—or head—of the Republic would lose an opportunity for the display of gracious magnanimity, while the internal development of the country would suffer the loss of men who have rendered signal service in that direction. But we are mainly concerned to look at the matter in its relation to the mining industry, and here it is of the supremest importance. The prisoners include among their ranks many leaders of mining enterprise in South Africa, and their incarceration for a long period would be a disastrous event in its relation to the future of the Rand mining. It was their zeal to defend the mining industry from the grasping encroachments of Governmental taxation, and to gain for the mining community the bare elements of citizenship rights which is responsible for their present hard case, and they will not fail to receive sympathy on all hands at home. Their banishment beyond the limits of the Republic would not serve the purpose of the ruling powers of the Transvaal, since men of the Reform leader type are a valuable element in a country's commercial prosperity. But whatever decision is to be taken at headquarters it would be well if it were determined upon speedily. There can be no useful purpose in the con-

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By Order,
J. JAMESON TRUMAN,
London Secretary.

May 19, 1896.

DIARY.

Tuesday, May 26.
Crown Reef, Johannesburg, 11.
Wednesday, May 27.
Prospectors' Association, Winchester House, 12.
Bamboo Queen and Reward Mines, Winchester House, 12.30.
Blackett's Claim Gold Mining Co., Winchester House, 2.
United Australian Exploration, Cannon-street Hotel, 2.
Thursday, May 28.
Polberro Mine Company, 37, Walbrook, 11.
London, Scottish, and American Trust, Cannon-st. Hotel, 11.
Red, White, and Blue Gold Mining Co., Winchester Ho., 2.30.
San Sebastian Nitrate Company, Winchester House, 2.30.
Golden Feather, Winchester House, 3.
Friday, May 29.
Lionsdale Estates (Limited), Winchester House, 12.
Elandsfontein No. 2 Gold Mining Co., Winchester Ho., 12.30.
Nobel's Dynamite, Winchester House, 1.

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LONDON: MAY 23, 1896.

WITWATERSRAND AS A GOLD PRODUCER.

THE report of the Witwatersrand Chamber of Mines for
the year 1895 has just reached us. Though its salient
figures have, of course, been known for some time, they
are, nevertheless, brought more vividly before us, when we have
an opportunity of analysing the various items, and of com-
paring them with previous years' results. It is simply impos-
sible to look at the output of the Witwatersrand without
being struck afresh each time by the wonderful producing
power of this small area. For, after all, on the most liberal
interpretation, the area covered by the productive Rand
claims, including even the deep levels, is only some 250 square
miles, and its output for last year was 2,277,640 ounces, worth,
it is calculated, £7,840,780 sterling. We know that last year
was by no means a satisfactory year as far as work was con-
cerned. The various political troubles that have since come to
a head were even then in the air, for JAMESON'S memorable
march had begun even before the year, of which we are now
studying the record, had ended. Whatever the merits of the
questions involved, it is clear that a good number of the leading
citizens of Johannesburg, connected more or less closely with the
gold industry, were not thinking solely of mining and milling
during the latter half, at any rate, of 1895, and it cannot but
have been that the partial division of their interests was
the cause of more or less slackness in their subordinates.

This much may be taken for granted, and it would well enough
account for returns being less than they would have been under
more peaceful circumstances.

From the report we see that the total number of natives
employed on the Rand is put down at over 50,000, whilst
it is estimated that the number required to keep the
mines in full swing is 60,000. This is a large number to
be concentrated in one small area, in so sparsely populated
a country as South Africa, and there is no wonder that a con-
siderable space in the report is devoted to the native labour
question, which is, no doubt, one of the most formidable diffi-
culties that has to be met. The recent outbreak in Matabele-
land shows what the raw material is like, and that habits of
steady industry have not yet taken the place of the savage in-
stincts of the South African native. Nor is it to be expected
that so radical a change could be worked in a few years; it
will take generations before the indolent, undisciplined Kafir is
broken in to the steady work that is desired of him. We
wonder, by the way, that the attempt to import Chinese labour
has never been made. Australia and America can bear witness
what an excellent gold miner John Chinaman makes, and there
would be no difficulty in importing 10,000 men direct from
China to the Rand. At any rate, the experiment is worth a
trial, and if properly handled we have no doubt as to the result.
The labour question has got to be threshed out, and as far as
last year is concerned, it seems certain that scarcity of native
labour was a main factor in the retardation of gold mining,
and in the diminution in the rate of increase which has hitherto
been maintained.

But even as it is, the production of over £7,840,000 from this
small patch of land is unprecedented in the history of gold
mining. There is nothing to compare it to, because it so far
exceeds any other mining district of approximately equal
size with it, and we actually find it necessary to insti-
tute comparisons between this insignificant patch of land
and whole continents. The total output of Australasia
exceeds that of the Rand, but not by much, and that
of the whole of the United States of North America is only
about half as much again. California and Colorado, the two
leading gold-producing states of the Union, whose output in
1895 was one-third more than it was in 1894, fall far short
together of the Rand output. The Indian gold mines are in a
flourishing condition, and Mysore takes high rank amongst the
gold fields of the world; yet their output in 1895 was only about
240,000 ounces worth roughly some £922,000. Yet these are highly
valuable and important fields, and can compare favourably with
most others in the world. Indeed, there are few reeking districts
that can be named to equal Mysore, and it is because they
occupy so eminent a position that we have chosen them for com-
parison with the Rand, and yet, as we see, their output is less than
one-eighth of the latter. This same point is brought out pro-
minently once again when we turn to Australia. The full re-
ports for 1895 for all the colonies are not to hand; the output of
Queensland will probably not be very far short of 700,000 ounces,
worth, let us say, £2,400,000, or less than a third of what the
Rand has done, yet Queensland is the leading gold producer in
Australasia.

Western Australia is just now being boomed with all
the energy that the Stock Exchange is capable of, and
fortunately its last year's returns are available. These are
just a little less than those of the Mysore district—namely,
231,500 ounces, worth £880,000, say about one-ninth of the
value of the Rand output; the relative area of the two gold
fields may be imagined from the statement that the area of the
Rand gold fields is little over twice that of the county of
London, whilst the area of the West Australian gold fields is
considerably over twice that of Great Britain. It is, of course,
quite true that Western Australia is in so far a newer gold field
than Witwatersrand, because it did not come into any promi-
nence as a producer till about 1892. In 1887, it produced only
4870 ounces of gold, whilst in the same year the Rand produced
23,125 ounces. They commenced their careers as producers
together, but the compactness of the Rand area and the almost
unique character of its deposits have been immensely in its
favour.

The biggest producer on the Rand is the Robinson Mine, with
a year's production of 167,207 ounces, valued at £566,600, whilst
several others, such as Langlaagte Estate, New Primrose, Crown
Reef, &c., run it pretty close. There are, altogether, five mines
on the Rand whose output was over 100,000 ounces in 1895;
the joint output of any two of these mines is greater than the
entire output of the whole of Western Australia. It is only
by means of comparisons such as these that the stupendous
producing power of the Rand can be fairly grasped. To attempt
to understand these enormous figures without comparing them
to other smaller ones is an all but hopeless task, and there are
many reasons why those interested in mining, and in fact all
Englishmen should desire at this juncture to get a clear con-
ception of what the gold output of the Rand really means.

Not only does Witwatersrand hold a unique place because of
the nature and importance of its deposits, but these have also given
rise to a unique system of gold extraction, which we find described
in the current report of the Chamber of Mines. We refer to
the process used at the George and May mines, a process which
we commented on as far back as the middle of last year. This
ore was at first treated by the usual Witwatersrand method—
stamp mill amalgamation followed by cyaniding of the tailings.
The ore assayed 9 dwts. 15 grains; the yield in the mill was
3 dwts. 19 grains, and by cyanide treatment 2 dwts. 18 grains,
or a total of 6 dwts. 14 grains, equal to a total extraction of
67.5 per cent., but as only 60 per cent. of the tailings could be
treated it was really only an extraction of 55.8 per cent. This
poor result led to an attempt to treat the poorer decomposed
ore of the outcrop by direct cyanidation, without any previous
amalgamation. The ore as mined is screened, the coarse going
through a Gate's crusher, and the mixed screenings and crushed
ore are trammed direct to the cyanide vats and treated in the
usual way. Four solutions ranging from 0.23 to 0.05 per cent.
of cyanide are used, and a final wash with clean water given, the

whole process taking 60 hours. The assay of the ore before treatment was about 5 dwts., and the extraction was 4 dwts. per ton, or 80 per cent.; a month's run gave an assay of 5 dwts. 6 grains, and extraction 4 dwts., or 76.2 per cent. It is obvious that the total extraction is better when amalgamation is omitted, because during the process of amalgamation, a large proportion of slimes is necessarily produced, and these slimes, which are untreatable by the cyanide process, carry off locked up in them a large amount of float gold. The cyanide process is known to be unsuitable to the treatment of ores which contain the bulk of their riches in the form of coarse gold, just as amalgamation in the stamp mill is an unsatisfactory method for treating ores that carry gold in a state of extremely fine division. How fine such gold must be before it is unsuitable for the stamp mill may be judged from the fact that very satisfactory stamp mill amalgamation has been performed on ore, the average diameter of the gold particles in which was only 1-250 of an inch. The successful results obtained at the George and May Company by the practical application of these principles would seem to point the way in which future improvements in gold milling may be expected. As depth is attained in gold mining, it seems that the character of the ore, all the world over, is gradually undergoing a change, inasmuch as coarse gold is becoming more and more scarce, and finely disseminated gold is apt to prevail. Under these circumstances it is quite possible that instead of using the cyanide process as an aid to amalgamation, gold miners will be compelled to use amalgamation merely as an adjunct to the cyanide process. The Rand was the cradle of the last-named process, and it is satisfactory to find that in one mine, at any rate, it has come to its full growth, and is able to stand alone.

There are many other points of interest in this report of the Chamber of Mines, which we would like to refer to if space permitted. Though it is throughout written in a studiously neutral tone, the Governmental difficulties by which the mining industry that centres around Johannesburg is hampered, are none the less clearly evident. Such matters as dynamite and cyanide monopolies, defective regulations for natives, taxes on coal, and numerous others have been discussed, and their bearing upon the success of gold mining is pretty evident. When a Chamber of Mines has repeatedly to petition the Government of a country that only lives by mining, on such subjects it can hardly be seriously maintained that there are no grievances to redress. The wealth that is being produced by the mining operations of the Rand is, as we have shown, enormous; how much greater it might be if existing restrictions were removed, it is hard to say. When a little patch of land like this has been capable of turning out nearly 9,000,000 ounces of gold—say, close on £30,000,000 sterling—within nine years, and when the very idea of exhaustion is not yet even mooted (in fact, when all researches show that the supply of precious metal is even vaster than was supposed by the most sanguine), it is, indeed, difficult to see where the limit of production is to be reached. And, surely, the men who have produced, and only ask to be allowed to go on quietly producing, such an addition to the world's wealth deserve recognition, encouragement, and support. It is not so very long since the phrase "unearned increment" was continually in the mouths of certain political economists—with a very strong accent on the political; if ever there was a true instance of unearned increment, it is assuredly in the revenue of this Boer Republic and the wealth of those Boer officials, who would, if existent at all, be in the last stages of pauperdom, were it not for the energy and enterprise of the oppressed Outlander, without whom Johannesburg would be non-existent, and the Witwatersrand the same barren, worthless veldt that it was till within the last 10 years. But neither the Witwatersrand mines nor Johannesburg itself are such testimonials to the industry and energy of the men who have created them, as is this annual report of the Chamber of Mines, a report that may well vie in completeness and accuracy with the similar productions of any Government, our own not excepted.

WATCH-DOGS NOT BLOODHOUNDS.

THE commerce of this country has been built up on trust and confidence. The assumption of innocence until the contrary is proved is the very foundation of our law, even when applied to the criminal classes. Cases every now and then undoubtedly arise which disclose such an abuse of the privileges which these high principles afford, as for a time at least, to shake the belief in their convenience and necessity. An illustration of this has been of recent years afforded by what are now known as the BALFOUR frauds. The Companies Act of 1862 supplied an opening to thousands of persons to invest their money in trade, and trading concerns, with comparative security that they would be able to reckon upon the cost. The great majority of businesses into which the public have embarked, relying upon the integrity of mankind in trade, in the long run proved to be honest, and the public has, consequently, further largely availed itself of the temptation and the opportunity. But the rule has at last been proved by the exception, and among the many virtuous appeared the rogues. The commercial confidence was shaken. The people appealed to the Courts to punish those who have been the instruments in this disaster, and to declare and define the limits and bounds which are to govern commercial morality.

It then comes about that Mr. Justice VAUGHAN WILLIAMS has been called upon to decide the responsibility attaching to those who, by their conduct, have seemed to have been implicated in violating the rules of honest trade. In determining particular cases it has been necessary for him to lay down with reference to certain classes of persons broad and general principles of duty; and thus as a kind of high priest in business morals he has declared to auditors their duty. It would be less than natural were the priest in no way influenced by the feeling of the world in which he lived. The temptation is obvious to become a strict disciplinarian,

and it, therefore, is not surprising if Mr. Justice VAUGHAN WILLIAMS should, catching the humour of the hour, over-state the duties of auditors. The Kingston Cotton Mill Company yearly issued balance-sheets, signed by its auditors, which were issued by the directors to the shareholders. An Act of Parliament passed in 1879 required of auditors of public companies that they should report to the members on the accounts examined by them, and on every balance-sheet laid before the company in general meeting, and whether, in their opinion, the balance-sheet referred to in the report is a full and fair balance-sheet, properly drawn up, so as to exhibit a true and correct view of the state of the company's affairs, as shown by the books of the company. It appeared that the auditors, relying on the certificate of the managing director, over-stated in the balance-sheets for several years the value of the stock-in-trade. This statement was deliberately false to the knowledge of the managing director, but the auditors believed it, and dividends were paid on the footing that the statement was correct. In the balance-sheet the auditors were careful to point out that they did not hold themselves responsible for the value of the stock-in-trade by stating that the value was "per the manager's certificate." Mr. Justice VAUGHAN WILLIAMS held they were not entitled to rely upon such certificate if an ordinary careful examination ought to have made them suspect that statement. The auditors took the value of the stock-in-trade from the stock journal, which was summarised and signed by the manager. The auditors trusted to the manager for the stock-in-trade in hand. Had they not done so, from other books which showed the quantity of stock bought and sold during the year they could have found that the stock in hand at the end of the year ought to be much less than the quantity shown in the stock journal, so much so that it must have excited suspicion. Under these circumstances, that learned judge was of opinion that the auditors had been wanting in the execution of their duty, and were responsible to repay to the company the moneys improperly paid as dividends by reason thereof. With this conclusion the Court of Appeal—consisting of Lords Justices LINDLEY, LOPES, and KAY—by an unanimous decision last Tuesday has thought fit to disagree. The learned judge and the Court of Appeal all agreed that it is no part of the duty of the auditor to take stock. But the one thinks it is the duty of the auditor to test the accuracy of the manager's certificate by a comparison of the figures in the books that require auditing; whereas the other is of the contrary opinion.

What, then, is the duty of the auditor? It is to ascertain the true financial position at the time of audit, by examining the books, taking reasonable care to ascertain that they show the true position. Having done this he has to frame a balance-sheet, showing that position according to the books, and to certify that the balance-sheet is correct in that sense. In doing this he is only required to exercise reasonable care and skill in making enquiry and investigations. He does not guarantee that the balance-sheet is accurate according to the books of the company, far less is he an insurer; nor does he guarantee that the books correctly show the true position of the company's affairs. Then comes the question what is reasonable care. That is a matter which must depend upon the circumstances of the case. The auditor must be honest, and where there is nothing to excite suspicion very little enquiry will be sufficient. More care will be required in cases of suspicion, but even then he is not bound to do more than exercise reasonable care and skill. He is not bound to be a detective or to approach his work with suspicion, or with a foregone conclusion that there is something wrong. As Lord Justice LOPES said on Tuesday last, "he is a watch-dog, but not a bloodhound." That learned judge added, "the duties of auditors must not be rendered too onerous. Their work is responsible and laborious, and the remuneration moderate."

With the general view expressed by the Court of Appeal, that an auditor is not to be a detective in the sense of approaching accounts with suspicion of fraud, we are disposed to agree, yet at the same time we are still inclined to sympathise with the view of Mr. Justice VAUGHAN WILLIAMS that, where the auditor has to take a statement on trust, such as the value of stock in hand, the accuracy of which can be tested by a comparison of figures in the books which he has to audit, it is his duty to check that statement, and if the result is to question the statement, and to raise suspicion, then, on the principles laid down by the Court of Appeal, he would have to enquire further. We fail for our own part to see that in this the auditor would be exceeding the limits of that character in which we are content to know him—namely, a good watch-dog. We have no desire that he should start his audit in the spirit of a hound smelling for blood.

NOTES AND COMMENTS.

We publish to-day an abstract of a leading article on the "Rigaud Total Gold Extraction" process, which we have taken from the *Credit National* of Paris, this paper devoting an illustrated special number to an account of the process and the works now finished at Tancarville. This supplement consists, in great part, of a repetition of the previous article upon M. De Rigaud's process, a full abstract of which we have already presented to our readers. It concludes, however, with a short article by the editor of the paper on the financial results to be obtained from the process; this article declares that the tailings of the world contains 27,000,000 francs worth of gold, the whole of which is to be extracted by the Total Gold Extraction Company with a clear profit of one half this amount. We do not know how these figures have been arrived at. One of the standard authorities on the production of the precious metals is the Director of the United States Mint. He makes out that since 1792 the total gold output of the world has been about 400,000,000 sterling; and when we remember that no gold was

produced in the United States, Australia, or the Transvaal before that time, that practically all gold produced before then, and the larger proportion since then is derived, not from quartz crushing, but from alluvial, it cannot be admitted that tailings exist containing over 100,000,000 sterling. There is a significant sentence in the last report of the Johannesburg Chamber of Mines to the effect that the accumulated tailings of the Rand have been practically all exhausted. There are other statements in this supplement that ought not to be passed over without remark, especially as they are repetitions of the statements that existed in the previous article, and can, therefore, not be set down as misprints or clerical errors. Working expenses of the cyanide process on the Rand are, in many cases, estimated to be not 4s., but 2s. per ton, and the time occupied is nearer three days than 30. How anyone can repeatedly write that the chloride of barium, cupric and ferric chlorides, chloride of lithium, chloride of nickel, and one or two others are insoluble in water is a mystery to us. Finally, we must be distinctly understood as expressing no opinion whatever on the process and its merits. We merely lay before our readers what is being said and done about a novel metallurgical process, and leave them to form their own opinions on the subject.

THE Randfontein Estates, one of the Robinson group, has just passed through a wonderfully successful year, in every way realising our prognostications of a year ago. The company owned, as is well known, a vast and very rich mining property, upon a small portion of which, 12 months ago, it was itself working, not without most encouraging results. But, apart from these mining operations, the chief profits of the company were to accrue from the sale of portions of its immense property to other companies. During the year several subsidiary companies have been formed, and already they have succeeded in accomplishing work which augurs most hopefully for the future. The first company to be formed was the Porges-Randfontein Gold Mining Company, which took over the mine of the Randfontein Estates. The capital of the company is £500,000, in £1 shares, of which 350,000 fully paid-up shares were paid to the parent company for the lease of the mine, and the machinery and plant. The next operation was the sale of six claims to the North Randfontein Gold Mining Company for 6000 shares. The whole of the line of reef for a distance of 3000 feet has been traced, and the property opened up to the second level. The mine has been fully equipped with the most modern machinery, a battery of 60 stamps is in course of erection, and milling is to be started at an early date. This company adjoins the Porges Company to the north, and the reef throughout the property is said to be well defined, with an average width of 6 inches, and assaying from 1 to 20 ounces per ton.

THE next transaction was the sale of 172 claims on the far Utvalfontein, adjoining the North Randfontein, to the Robinson Randfontein, for 375,000 fully paid-up £1 shares. The capital of this company is £600,000, of which £70,000 is working capital. The reef in this property has been traced throughout its whole length—namely, 3150 feet, and the first level has been opened over a distance of 2200 feet. We are told that the machinery is on order, and that work is being pushed forward vigorously. The reef exposed has a width of 6 inches, and assays as high as 62 ounces to the ton have been obtained. Since the formation of the Robinson Randfontein, however, it was found that as the reef extended for over 6000 feet along the strike, it was capable of being worked by more than one company to advantage. The result was that a portion has been sold to the Block A Randfontein Gold Mining Company for 400,000 shares. By the recent acquisition of the outcrop claims the Block A company has also the reef running through the length of the property some 3000 feet, and various assays have given as high as from 2 to 5 ounces to the ton. Following the flotation of the Robinson Randfontein the reef was traced in the adjoining mine, and, therefore, a company was formed to take up this, called the Mynpacht Randfontein Gold Mining Company, with a capital of £750,000. For its rights in this company the Randfontein Estates obtained 500,000 fully paid shares. On this mine the reef has been located by means of a bore hole, and assays as high as 5 ounces 4 dwts. to the ton have been obtained. Altogether the Randfontein Estates has disposed of 624 claims, for which a total of 1,483,500 shares have been received, which at present market prices represent a sum of £2,500,000.

ALMOST the only sentiment with which the sentences upon the Reform leaders were received in London was one of incredulity that they would ever be carried into effect. This view has been strengthened by time, and further supported by the cablegrams received through the British agents. There could hardly be, from the Boer point of view, any reasons which could impel them to exert the utmost rigour in dealing with the prisoners. The heads—or head—of the Republic would lose an opportunity for the display of gracious magnanimity, while the internal development of the country would suffer the loss of men who have rendered signal service in that direction. But we are mainly concerned to look at the matter in its relation to the mining industry, and here it is of the supremest importance. The prisoners include among their ranks many leaders of mining enterprise in South Africa, and their incarceration for a long period would be a disastrous event in its relation to the future of the Rand mining. It was their zeal to defend the mining industry from the grasping encroachments of Governmental taxation, and to gain for the mining community the bare elements of citizenship rights which is responsible for their present hard case, and they will not fail to receive sympathy on all hands at home. Their banishment beyond the limits of the Republic would not serve the purpose of the ruling powers of the Transvaal, since men of the Reform leader type are a valuable element in a country's commercial prosperity. But whatever decision is to be taken at headquarters it would be well if it were determined upon speedily. There can be no useful purpose in the con-

tinual delays and hesitation, which, as a daily paper wittily remarks, bring the whole proceeding into close resemblance to a Dutch auction.

ACCORDING to Mr. Peter Watson, the shareholders in the Devon Great Consols are gradually emerging from the time of difficulty which has beset them during the past two years, and there is now every prospect of good returns being again obtained from the working of the property. True, at the meeting on Tuesday, the directors were unable to recommend the declaration of a dividend, but what was greatly gratifying was the announcement that a new discovery of some splendid copper ore ground had been made in Watson's part of the mine. The find was made in the bottom level, but it is confidently expected that the same body of ore will also be found in the ground above, which up to the present has not been opened. In the event of the ore-body proving to be of considerable extent, it will be the means of substantially increasing the company's returns. The proprietors must also have been pleased to learn that the marketable value of both copper ore and arsenic still shows a tendency to increase. In fact, although 69 tons less of copper ore was sold during 1895 than in 1894, the amount realised in the former year was, comparatively speaking, considerably larger than that obtained in the latter. In regard to the several accidents which have occurred at the mine within the past 12 or 18 months, it seems that the only matter which remains to be attended to, in order that the company's works may be once more thoroughly efficient, is the erection of the bridge over the river. However, the arrangements for the erection of a new bridge, capable of bearing heavy traffic, are rapidly approaching completion, and owing to the liberal manner in which the necessary amount is being made up in the district, the shareholders need have but little fear that their portion of the cost will be a large one. All things considered, we venture to believe that a very prosperous future is in store for the undertaking.

In their annual report the directors of Golden Feather (Limited) make a great effort to encourage the shareholders, though we are afraid that in this they will not meet with any great success. The unfortunate thing is that similar promises have been held out so frequently, and with such force, that the shareholders are not likely to be again thrilled by them. They will this time be inclined to listen to these words of encouragement with more philosophy, and with a determination to be influenced only by facts, and not by the sanguine utterances of the directors. The operations for the past year result in a debit balance of £2283 5s. 7d. The directors cite the well-known fact that the system of working hitherto adopted has not proved satisfactory, but they place such great hopes upon what Mr. Evans can do that they feel assured he will be enabled "to work the claim successfully, and with a rapidity hitherto unknown in the history of the company." This Mr. Evans will do "with his improved elevators and appliances," but after the experience of the past it would be wise not to be carried away by this enthusiasm, but to wait patiently to see if these forecasts will be realised. The directors further congratulate themselves that, after past failure and disappointment, the untouched ground is now within reach. They add that they would never have continued year by year to struggle on in the face of continued failure, had they not been convinced by the past history of the river and by practical prospecting tests of the great value of the gravels. We sincerely hope that their anticipations will be realised. We cannot be participators in their enthusiasm, nevertheless we can wish them every success.

INCREASING attention of late years is being paid to zinc. The zinc production of Europe in 1895 reached a total of 331,460 tons. In 1887 it amounted to 260,089 tons, having steadily increased since then, and aggregating 310,470 tons in 1894. The production of different countries and districts was as follows, in tons, in 1894 and 1895 respectively:—Holland, Belgium, and Rhenish Prussia, 152,420 and 172,135; Prussian Silesia, 91,145 and 93,620; Great Britain, 32,095 and 29,495; Spain and France, 21,245 and 22,895; Austria, 8580 and 8355; Poland, 5015 and 4060; and United States, 64,409 and 78,206. The average price in London in 1895 was £14 12s. 6d., against £15 9s. 8d. in 1894. The highest quotation within the last 15 years was £23 5s. in 1890, and the lowest £14 in 1895. An investigation into the properties of copper-zinc alloys has recently been made by M. G. Charpy. Eighteen different alloys were prepared, and bars of them rendered as hard as possible by hammering and cold rolling. They were then annealed at temperatures gradually increasing up to the point of fusion. The annealed bars were then tested in tension and compression, and also by a shock. Specimens were also prepared from the bars for microscopic examination. From his experiments M. Charpy concludes that the physical properties of each of the alloys are in general dependent on the previous history of the bar examined, but that the effects of mechanical treatment can be entirely got rid of by thorough annealing. Hence, in comparing the quality of different alloys, they should all be tested in the annealed state. When this is done it is found that the physical properties of the copper-zinc alloys vary quite continuously with the percentage of zinc present. The rigidity of the mixture increases with the content of zinc, and the strength is a maximum when the alloy contains 45 per cent. of that metal, after which it decreases rapidly. The toughness of the metal, as shown by the percentage elongation, is a maximum when the zinc is about 35 per cent. of the whole. With more than 43 per cent. of the zinc the alloy is liable to be brittle.

INTERESTING information has just reached this side with regard to the position that has now been attained by the renowned coal field of Pennsylvania so far as regards its chief centre—namely, the Pittsburgh district, in which are situated some of the chief mining properties of America. The Pittsburgh, Fairport, and North-Western Dock Company, with a capital of about £85,000, own 1700 acres of land at Wilcock

Station, on the Baltimore and Ohio Railway, with a yearly production of 390,000 tons. The mines of this company are worked with all the latest modern equipment, including steel tipplers, cutting machines operated by compressed air, and steam haulage arrangements. Mr. Francis L. Robbins, who is the general manager of the company, also controls several other undertakings, representing in the aggregate over 10,000 acres of valuable coal lands, having an annual capacity of 2,000,000 tons, and, in fact, is the largest individual coal owner of that important district. Mr. Henry Floersheim is another well-known owner of coal mining property. He is the proprietor of the Nottingham Mine and the Germania Mine at Finleyville, Pennsylvania, and these produce a superior quality of bituminous coal, which is considered one of the richest gas coals in the United States, with a daily output of 1600 tons. The New York and Cleveland Gas Coal Company has 10,000 acres of coal-bearing land, mainly on the Pennsylvania Railway, with a daily output of 8000 tons. They use a great deal of machinery, besides employing 1500 men. The Berwind-White Coal Mining Company, incorporated in 1886, is the successors of Berwind, White, and Co. (a coal-producing firm organised in 1874), with a capital of £400,000, owns and works extensive coal mines in the Clearfield region. This company has 29 collieries, with a combined capacity of over 12,000 tons per day. The works are among the best equipped in the bituminous coal region of America, and are supplied with all the best modern machinery. They own some 1500 coal trucks and a fleet of 50 coal barges, the latter being exclusively used for the delivery of coal to ocean vessels in New York harbour, among its consumers being the Cunard, the North German Lloyd, the American, the Hamburg, and the French lines. Their mines are situated near the Pennsylvania Railway, which system they use to get to the ports for shipments both coastwise and foreign, and to get also to New York, the New England States, and Canada. In fact, the Berwind-White Company claim to be the largest coal mining company pure and simple in America, employing as they do over 5000 men, with a yearly output of the value of over \$8,000,000, or equivalent to nearly £1,600,000 of English money.

THERE is by far too great a disposition on the part of shallow politicians to assume that the Right Hon. Joseph Chamberlain has been finally worsted in his diplomatic encounter with the Transvaal Republican autocrat. Even the first humorous journal in the world—the only hebdomadal publication in Britain, perhaps, that knows how to give its humour the classical stamp, and to rigorously divide it from nonsense on the one hand, and Philistinism on the other—has committed, for it, an almost unpardonable blunder in this regard. So short is the popular memory that the vendors of cheap political philosophy are beginning to forget—if, indeed, they ever realised—that the British position has throughout been made doubly difficult by a false start, and that Mr. Chamberlain has to give rapid play to a shrewd, if obstinate, dabbler in statecraft, who, joyous in possessing the advantage at the commencement, has not allowed the sentiment of satisfaction to expose an unguarded opening to his adversary. But President Kruger is no bloated monopolist in the gift of shrewdness, and those who have followed the extraordinary career of the great English statesman from that early opening in the Birmingham Municipal arena to this last admirable essay in Imperialist policy, will not doubt that Mr. Chamberlain will make every possible defence of British interests and British prestige. That the Colonial Secretary suffices his official acts with a choice and delicate spirit of pleasantry detracts nothing from their worth. He may be permitted to enquire with a grave face after Mrs. Kruger's health, and the country will not object to the *jeu d'esprit*, even though it cost over 5s. a word, and even hope that the final laugh will be with them. In the same way President Kruger may continue with the most juggler-like dexterity to bring forth telegrams from under his coat-sleeves, and provided there be union at home, nobody will be a sou the worse. Most people at home will remember to have wondered, in the guilelessness of youth, at the achievements of the man who brings a rabbit, several flags, and a loaf of bread out of a top hat; and President Kruger must not expect to frighten English people by a proceeding so much akin to the bill of fare at the Egyptian Hall.

It may well be doubted whether gold mining prospects in Western Australia were ever so bright as they are at present. Despite the doleful prognostications of the professional pessimist, the water difficulty is in a fair way of being overcome, while a serviceable, and, with certain limitations, complete service of railways and telegraphs is adding to the possibilities of successful and efficient mining operations. Mr. Algernon Moresing's recent utterances respecting the manner in which the water famine has been combated are likely to disconcert the misanthropists who pronounced with so much complacency as to the certainty with which the gold industry was going to be ruined by the prevailing drought. It will be remembered that at a recent meeting Mr. Moresing said:—"The water question, in my opinion, has been settled for all practical purposes. The successful application of the Brownhill system of dry crushing and cyanidation in barrels, together with the plant being driven by means of petroleum oil engines, thus doing away with all the trouble of steam boilers, has rendered it possible now to work mines where the amount of water is extremely limited, and where that water may be salt. The introduction of the Caird and Rayner condenser enables wholesome drinking water to be obtained in large quantities from those horrible salt lakes, and as far as I am personally concerned, and after very careful study, I consider that the question of water need no longer agitate the minds of shareholders in Western Australian companies." Even the unhappily constituted mortals who, by a sort of second sight, are generally enabled to read discouragement into the most favourable expression of views, will find it hard to discount the

value of this statement, coming, as it does, from a highly experienced quarter.

A DETERMINED effort is being made in certain French commercial circles to oust British coal from the French Northern markets, the imports of which amount to several millions of tons yearly. According to the original proposal by which this was to be effected, the Government were pressed to lower the rates upon freightage in such a way as to enormously encourage the development of the Northern French coal field, and to handicap to the same extent the introduction of the foreign commodity. During the last 10 years a most satisfactory development has taken place in the home consumption of French coal, which gave every promise that in a short time and under the normal conditions of progress the northern industry would make highly satisfactory headway. But this was not sufficient for the extreme protectionists, who, regardless of the fact that a large shipping industry at Rouen would receive a heavy blow from any severe measures, proposed such a reduction upon the railway rates between the northern collieries and Normandy, and Western France, as would have amounted to a heavy bounty upon the home coal. Pressure was brought to bear upon the Government to approve of a new zone tariff, with the amiable object of crushing the British industry. An unexpectedly vigorous opposition to the new measure was, however, encountered at Rouen, where vehement protests were entered against all interferences with an industry which brought 200 vessels yearly to Rouen from British ports. The loss to the town from tonnage and pilotage dues, and the blow which would inevitably be dealt at the local labour market, roused the Rouen Chamber of Commerce to immediate action. In the result a compromise has been arrived at by which the new rates will be adopted, but will have a wide applicability so as to exert a beneficial influence upon British as well as French trade.

THE MINING MARKET.

FRIDAY EVENING.

Extension of the Western Australian Boom—Kaffirs drooping on the result of the Pretoria trials.—Continued activity in Indians.

AS we anticipated in last week's market report, the West Australian department has experienced not only a material improvement in values, but a widening in the volume of business. The market, in fact, now occupies a more satisfactory position than it has ever reached before. The migration of a large body of dealers, such as has taken place during the present month, cannot fail to have a beneficial effect in the introduction of additional capital, with the resulting added facility for speculative business. West Australians have entirely given Kaffirs the go-by, not only in the estimation of constant operators, but with the daily financial journals. It is reported that one of the big financial houses which took first rank during the South African boom, is now introducing capital to the West Australian market. As soon as the holidays are over, we confidently expect to see a very big business done, which will quite eclipse all movements that have gone before. In the meantime, we are upon the eve of two or three days' closure, and the final movements are not of the stirring interest that has been provoked earlier in the week.

Business on Saturday was on the usual limited scale, though the tone was distinctly buoyant for West Australians. Africans were irregular, with small losses preponderating. New Zealanders and Indians were steady. On Monday the West Australian boom was in full swing, and several important gains were scored, attention being quite diverted from Kaffirs in the absence of stimulating news. Indians were active, and New Zealanders steady. On Tuesday morning there was a set back in West Australians owing to extensive realisations, but the market recovered before the close. Kaffirs were still neglected, with movements of little importance, and the Miscellaneous Market did not attract much attention. On Wednesday the Kaffir Market was influenced by the first reports of the decision of the Transvaal Government as to the fate of the Pretoria prisoners. Rumour was not in accordance with the facts subsequently notified, and the close for Kaffirs in the Street was distinctly harder on erroneous assumptions, so that the following morning, with its revised intelligence, saw a reversal. A large business was again done in West Australians, which closed firm after some irregularity. Indians were good, but New Zealand shares were inclined to ease off. On Thursday the shadow of the approaching holiday asserted itself, and there was less business doing, though the tone was firm in all departments, with special elasticity in Indians. To-day the attendance has been smaller, and a marked falling off in business is reported. This, however, is easily explained by the imminence of Whitsuntide. West Australians have closed at the best prices of the day, but the Kaffir Market is flat, and quotations generally lower.

South Africans.

There has been the customary crop of unreliable rumours as to the intentions of Mr. Barnato with regard to the closing down of the mines under his control, but the only factor of real importance has been the announcement of the revised sentences upon the Pretoria prisoners. The Kaffir Market is distinctly weak at the close, and though losses on balance are not heavy, they represent a serious aggregate depreciation. Chartered have fallen $\frac{1}{4}$ to 3 $\frac{1}{2}$, Goldfields Deferred $\frac{1}{4}$ to 11 $\frac{1}{2}$, Goldfields Deep $\frac{1}{4}$ to 9 $\frac{1}{2}$, and Gold Trusts $\frac{1}{4}$ to 7 $\frac{1}{2}$. Land shares generally are dull, Bechuanaland at 1 $\frac{1}{2}$, Hendersons at 2 $\frac{1}{2}$, Mozambique at 1 $\frac{1}{2}$, Oceana at 1 $\frac{1}{2}$, Rand Exploration at 1 $\frac{1}{2}$, Zambesia at 2 $\frac{1}{2}$, Exploring Land and Minerals at 1 $\frac{1}{2}$, and Rhodesia Exploring at 6. Barnato Consols have lost $\frac{1}{4}$ at 2 $\frac{1}{2}$, as the direct result of the rumours already referred to, but the most serious decline in this group is Buffelsdorp, $\frac{1}{2}$ down at 2 $\frac{1}{2}$. George Goch at 2 $\frac{1}{2}$, Johannesburg Investment at 3 $\frac{1}{2}$, May Consolidated at 2 $\frac{1}{2}$, Primrose at 5 $\frac{1}{2}$, Rietfontein at 3 $\frac{1}{2}$, Glencairn at 3 $\frac{1}{2}$, and Spes Bona at 1 $\frac{1}{2}$ are all $\frac{1}{4}$ or so easier. The Robinsons Group is less firm than it has been, Randfontein closing at 3 Block B at 1 $\frac{1}{2}$, Langlaagte at 5 $\frac{1}{2}$, and Robinson Banks at 6 $\frac{1}{2}$. East Rands have given way perceptibly, closing $\frac{1}{4}$ down at 6 $\frac{1}{2}$ with Comets and St. Angelo sympathetically Consolidated and 4 $\frac{1}{2}$. Rand Mines have receded to 28 $\frac{1}{2}$, Consolidated Deeps to 25 $\frac{1}{2}$, Nigel Deep to 1 $\frac{1}{2}$, and Roodepoort Deep to 2 $\frac{1}{2}$. In the Eckstein group changes are not important, but Modder was at one time very flat, receding to 7 shillings. At 7 $\frac{1}{2}$ a de-

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cline of $\frac{1}{2}$ is shown, whilst City at $\frac{1}{2}$, Henry Nourse at $\frac{1}{2}$, Jumpers at $\frac{1}{2}$, Nigel at $\frac{1}{2}$, Salisbury at $\frac{1}{2}$, and Wemmers at $\frac{1}{2}$, are all fractionally lower. Orions have been very much out of favour, and leave off 10s. down at $\frac{1}{2}$. Knights have shed $\frac{1}{2}$ at $\frac{1}{2}$, Banties $\frac{1}{2}$ at $\frac{1}{2}$, Durban at $\frac{1}{2}$, Meyer and Charlton $\frac{1}{2}$ at $\frac{1}{2}$, Van Ryns $\frac{1}{2}$ at $\frac{1}{2}$, Wolhuter $\frac{1}{2}$ at $\frac{1}{2}$, and Village Main Reef $\frac{1}{2}$ at $\frac{1}{2}$. The small Lydenburg Group has been quiet, with the exception of Spitzkop, which rose to £1 in the middle of the week, closing 2s. 6d. better at 19s. Diamond shares have been dull, De Beers having receded to 28 $\frac{1}{2}$ and Jagers to 10 $\frac{1}{2}$ —losses of $\frac{1}{2}$ and $\frac{1}{2}$ respectively.

West Australians.

The Hannan's group has attracted the lion's share of attention, and several remarkable movements are shown as the result of the week's dealings. None, perhaps, has been more sensational than the run up in North Boulders, which close at 90s., as compared with 13s. a week ago. These are 10s. shares which at the beginning of April could be picked up round about 5s. No prospectus was ever issued, and the shares were originally put upon the market at a discount, but the property enjoyed a good local reputation, and the buying has been for very well informed people. Great Boulders leave off the market turn easier at 9 $\frac{1}{2}$. The usual conflicting rumours as to the first crushings at Hannan's Brownhill have caused excited movements in the shares, which after receding below 7, close $\frac{1}{2}$ higher at 7 $\frac{1}{2}$. Lake Views have been in strong demand, and close $\frac{1}{2}$ higher at 7 $\frac{1}{2}$. Associated at one time advanced to 2 $\frac{1}{2}$ buyers, the quotation in Coolgardie being cabled over as good as 3 $\frac{1}{2}$. The last price is 2 $\frac{1}{2}$, which marks a gain of $\frac{1}{2}$ on the week. The best judges still regard these shares as among the cheapest in the market, and high figures are predicted when crushing returns come to hand. The subsidiary Lake View South touched 2 $\frac{1}{2}$ earlier in the week, though the quotation has eased off since. Coolgardie Mint and Iron King are $\frac{1}{2}$ better at 2, a gain of $\frac{1}{2}$ having taken place to-day. True Blues have been quietly bought on rumours of an impending amalgamation. At $\frac{1}{2}$ the shares are $\frac{1}{2}$ better, whilst Lady Loch at $\frac{1}{2}$, Paddington Consols at $\frac{1}{2}$, Oroya at $\frac{1}{2}$, Hannan's Star at $\frac{1}{2}$, and Sir John Forrest at $\frac{1}{2}$, are all on last week's mark. Hannan's Reward have advanced $\frac{1}{2}$ to 4 $\frac{1}{2}$, and Golden Group and Golden Treasure are about half a point up at $\frac{1}{2}$ and $\frac{1}{2}$ respectively. The changes in the Menzies Group are not important, either way being the extent of the fluctuations: 1. Ormside at $\frac{1}{2}$, O'Driscoll at $\frac{1}{2}$, Florence at 2 $\frac{1}{2}$, and Lady Shenton at 3. White Feathers are finally rather easier at 2 $\frac{1}{2}$, but others in the same group have improved, Black Flag $\frac{1}{2}$ to 2 $\frac{1}{2}$, Hit or Miss $\frac{1}{2}$ to 2 $\frac{1}{2}$, Wealth of Nations $\frac{1}{2}$ to 1 $\frac{1}{2}$, and Ejudina $\frac{1}{2}$ to 1 $\frac{1}{2}$. Bayley's Reward are 1s. up at 5s. 9d. W. A. Goldfields have shown signs of weakness on profit taking, after the sensational rise of last week, but the last price $\frac{1}{2}$ is well above the worst. Hampton Plains are a shade harder at 5 $\frac{1}{2}$, whilst Mainland Consols have lost $\frac{1}{2}$ at 3 $\frac{1}{2}$. A small share which has come in for increased attention is Bass and Finders. The property is in the Lake Lefroy district, and dealings are for special settlement next week. The price has improved 2s. 3d. on the week to 9s. 3d. Mawson's Reward, which a few weeks ago could be picked up at 6s., or 7s., had a spurt on Tuesday to 25s., but have receded almost as rapidly to 17s. 6d., which is about the same as last week's price. The prospects of amalgamation have led to renewed activity in Exploring and Finance and London and Globe, which close about $\frac{1}{2}$ up at $\frac{1}{2}$. Share Corporation have been actively inquired for, and leave off $\frac{1}{2}$ higher at $\frac{1}{2}$ premium. Colonial Finance has improved $\frac{1}{2}$ to 4 $\frac{1}{2}$, whilst the Founders shares are five points better at 75. Lady Mary is one of the few shares lower on the week, a crushing return showing a yield of only $\frac{1}{2}$ an ounce to the ton having discouraged holders. The foregoing comprise the majority of movements of marked importance, though there have been plenty of minor changes, and the resumption of business will doubtless be attended with increased activity. The account commences on Tuesday, and much, of course, depends upon the Continuation rates. It is not, however, expected that these will prove unduly onerous.

Miscellaneous.

In the Indian Groups supporters of Champion Reefs and Mysore have once more indulged in a battle royal, in which at the moment neither can claim the victory, as the last price, 7 $\frac{1}{2}$, is the same in both cases. The gain in Mysore is $\frac{1}{2}$, and in Champion Reefs $\frac{1}{2}$. Nundydroogs have put on $\frac{1}{2}$ at 3 $\frac{1}{2}$, and Ooregum $\frac{1}{2}$ at 3 $\frac{1}{2}$. Some determined manipulation has been in progress in the shares of the Consolidated Gold Fields of New Zealand, which close $\frac{1}{2}$ better at 3 $\frac{1}{2}$. Waiki is unchanged at 6 $\frac{1}{2}$, but Waitakauri has advanced, $\frac{1}{2}$ to 5 $\frac{1}{2}$, Kapanga 1s. 6d. to 16s. 6d., Hauraki 1s. to 15s. 6d., and Scott's 1s. 3d. to 4s. 6d. Charters Towers are steady, with Brilliants rather better at $\frac{1}{2}$, and Day Dawns firm at 12s. 9d. The Copper Group is not much changed. Tintos are on last week's mark at 2 $\frac{1}{2}$, Copiapo and Capes rather better at 2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ respectively, and Mason's $\frac{1}{2}$ down at 3 $\frac{1}{2}$. An attempt has been made to widen the market in Anaconda, but the shares are only $\frac{1}{2}$ up at 6 $\frac{1}{2}$. Broken Hills have hardened to 2 $\frac{1}{2}$, and British to 26s. Mount Morgans are $\frac{1}{2}$ easier at 3 $\frac{1}{2}$. Speculative attention has been directed to Gibraltar Consols, a new South Wales property, the shares of which close $\frac{1}{2}$ higher at 1 $\frac{1}{2}$.

STOCK EXCHANGE SETTLING DAYS.

CONSOLS.

Monday, June 1.

MINING MAKING-UP DAYS:

Tuesday, May 26 | Tuesday, June 9

MINING NAME DAYS:

Wednesday, May 27 | Wednesday, June 10

ACCOUNT DAYS:

Friday, May 29 | Friday, June 12

HOLIDAYS:

Saturday, May 23, and Monday, May 25

THE IBERO-AMERICAN BENEVOLENT SOCIETY.—The sixth anniversary festival of this society was held at the Whitehall Rooms of the Hotel Metropole, on Friday last, the 5th inst., the chair being occupied by His Excellency the Conde de Casa Valencia (Spanish Ambassador.) Amongst those present were Dr. Don Alberto Nin; M. L. J. Janvier; Don A. Basconan; Don E. Lembcke; Don F. A. Aramayo; L. B. Tamini, Esq.; C. D. Seligman, Esq.; Don C. R. Ballesteros; Don S. Seijas; Don A. T. Serrano; Mr. Sheriff Cooper; Mr. Cooper; R. K. Gray, Esq.; Dr. Ledlie; J. H. Milton, Esq.; Don J. J. Carreras; Ilmo; Senor Don N. E. Jauralde; Don Luis Camacho; Richard J. Middleton, Esq., F.R.S.E.; Hon. A. Wynne; P. T. Proddle, Esq.; Dr. J. Clifford; N. J. H. Schotborgh, Esq.; P. W. Pixley, Esq.; A. E. Walton, Esq.; T. C. Worsford, Esq.; A. C. Hammond, Esq. The banquet was followed by a concert under the direction of Cavaliere Tito Mattel.

It is announced that the share certificates of the UNIVERSAL CORPORATION OF WESTERN AUSTRALIA (LIMITED) are now ready, and can be received on application in exchange for bankers' receipts.

THE INSTITUTION OF CIVIL ENGINEERS.

At the ordinary meeting, on Tuesday, Sir BENJAMIN BAKER, K.C.M.G., the President, in the chair, two communications dealing with the Magnetic Properties of Iron and Steel were considered.

The first paper was entitled

The Magnetic Testing of Iron and Steel.

by Professor J. A. EWING, F.R.S., M. Inst. C. E. The author referred to the practical importance which now attached to the magnetic testing of iron and steel in relation to the manufacture of dynamos and transformers. From being a mere laboratory experiment, interesting only to students of physics, it had passed into the rank of an engineering operation. Iron makers now supplied material greatly superior, from the magnetic point of view, to that which could be obtained even two or three years ago. In dynamo construction the introduction of permeable steel castings for the field magnets had given greater latitude as to form without loss of efficiency, the best steel castings being, indeed, somewhat better magnetically than most forged iron. In stampings of sheet metal for transformers the main consideration was absence of hysteresis, and so great had been the advance in this respect that iron was now readily obtainable with only half the amount of hysteresis which was considered possible a few years ago. This had brought about a notable increase in the efficiency of alternate current distribution by reducing the large element of loss which occurred through the hysteresis of transformed cores during the hours of light load as well as of heavy load. The author recalled the conventions according to which the magnetic quality of iron was expressed. The most usual test was one to determine the relation of the magnetic induction to the magnetising force, the ratio of B to H being the permeability. To enable H to be determined with accuracy, the specimen was arranged as a closed ring, or as an ellipsoid, or as a bar or bars rendered practically endless by the use of a yoke. Ballistic methods of testing were described, and it was shown how in the use of a yoke the proper correction might be experimentally found to deduce the true magnetising force by allowing for the magnetic resistance of the yoke itself. For this purpose the author used a pair of bars joined by two short yokes at their ends, the yokes being shifted so as to include either the whole length or half the length of the bars in the magnetic circuit. Reference was made to various forms of apparatus designed to measure the magnetic induction by observing the force required to separate surfaces in the magnetised piece, and a form used by the author was described in which a yoke piece was simultaneously drawn away from polar extensions at both ends of the bar. A novel apparatus was shown in detail for measuring permeability by comparing the magnetising force required to produce a given induction with the force required to produce equal induction in a standard bar. This apparatus, which the author terms a magnetic bridge from its analogy to the Wheatstone bridge for the measurement of resistance, reduced the operation of testing to a comparison between the specimen and a bar, the magnetic quality of which had been determined once for all by the instrument maker. The two bars were connected by end yokes, and by varying the number of turns in the magnetising coil on one of them, the yokes were brought to the same magnetic potential. The relative number of turns on the two thus gave the relative magnetising forces required to produce the same induction in both. A simple form of magnetic detector showed when the two yokes were brought to the same potential. The manipulation consisted in varying the number of turns acting on one bar by means of dial switches, while the magnetising current was from time to time reversed. This permeability tester was intended for workshop use, and might take its place alongside of the author's hysteresis tester which was also described. The methods of directly measuring hysteresis were briefly referred to.

A number of representative examples were given of permeability tests of forged wrought iron, forged steel, and cast steel for dynamo magnets; also of hysteresis tests of transformer plate rolled from Swedish wrought iron and from ingot metal. The results were shown by means of numerical tables, and also in curves.

The second paper, on

Magnetic Data of Iron and Steel.

was by Mr. H. F. PARSHALL, Assoc. M. Inst. C. E. Magnetic tests of iron and steel might be conducted to determine such properties as permeability, maximum magnetisation, residual magnetism, and permanent magnetism, and the relation they bore to tempering, annealing, internal stresses, composition, and processes of manufacture. The loss of energy through hysteresis might be determined either magnetically by determining the area of the loop formed by plotting the flux densities as ordinates, and magnetic force as abscissas, or mechanically by suitable power-measuring apparatus. A study of the magnetic results and of the chemical analysis showed a more or less intimate relationship according to the degree with which the modifying physical conditions might be controlled. In general, a greater degree of purity was an indication of high permeability, but as the different qualities of iron and steel merged into each other by insensible degrees, owing to variations in the processes of manufacture, chemical analysis might be taken only as an approximate indication of the magnetic properties. Carbon was the most important element entering into the composition of commercial iron, and within the limits that chemical analysis might serve as an indication of the physical structure, the permeability was inversely as the amount of carbon present. The limitation as to the state of physical structure was greatly affected by the state of the carbon, that was, whether free or combined; in cast iron as well as in steel, the effect of graphite was second to that of the carbide, commonly known as fixed or combined carbon.

Beyond a certain degree of purity, as in wrought iron and carbon steels, the treatment as to annealing and tempering became of first importance. The magnetic properties of some of the alloys of iron, nickel, or manganese were such as to show that the physical structure was the ultimate determining factor. The hysteresis loss was in general inversely as the degree of purity, but in comparatively pure irons it was determined principally by its treatment as to annealing, heating, and mechanical straining.

FIRE AT WHEAL AGAR.—On Wednesday in last week at about 12-30 (noon), the carpenter's shop at Wheal Agar Mine was found to be on fire. It appears that the hedges were set on fire, presumably by some boys, and the flames caught the shop. In spite of the efforts of many willing helpers, superintended by Captain Daniel, the house was entirely destroyed in a very short time. The structure was built entirely of wood and was exceptionally dry and inflammable through the great heat of the weather. Most of the tools had been recently removed from the shop. The accident will not affect the working of the engine, though some of the launders carrying the water from the engine were destroyed.

THE METAL MARKETS.

THE METAL MARKET, LONDON, MAY 22.

Copper.

THE New York Market continues very strong, and our market has further improved under the influence of the good reports thence. Consumption is active, stocks have again undergone a large decrease—viz., nearly 1700 tons for the first half of May, and there has been a good demand for fine copper from many quarters. The speculative market opened at 215 5s. cash, g.m.b.s. and 216 11s. 3d. three months, touched 216 10s. and 216 15s. respectively on Tuesday and 216 12s. 6d. and 217 on Wednesday, after which we eased slightly to 216 11s. 3d. s.c. and 216 12s. 6d. s.c. three months. Yesterday the tone was again firm, with business at 216 12s. 6d. s.c. and 216 13s. 9d. to 217 three months, and this morning, after a very active business at 216 12s. 6d. to 216 17s. 6d. s.c., and 217 to 217 2s. 6d. three months, we closed to (re-open on Tuesday) at 216 17s. 6d. to 216 18s. 9d. s.c., and 217 1s. 3d. to 217 2s. 6d. three months.

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Has been a very steady market, with moderate transactions, varying from about 150 to about 250 tons per day, whilst prices have, on the whole, tended to grow firmer. Business in Straits tin was done on Monday at 260 2s. 6d. s.c. and 260 12s. 9d. three months; on Tuesday at 260 5s. to 260 7s. 6d. s.c. and 260 17s. 6d. three months; on Wednesday at 260 5s. and 260 7s. 6d. s.c. and 260 17s. 6d. three months, and this morning, after transactions at 260 17s. 6d. and 260 18s. 9d. three months, we closed firm at 260 6s. 3d. to 260 7s. 6d. s.c. and 260 17s. 6d. to 260 18s. 9d. three months. In the Dutch market there was an improvement from 35 $\frac{1}{2}$ fl. to 36 $\frac{1}{2}$ fl. for cash Billiton. The close is firm at 35 $\frac{1}{2}$ fl. s.c., with three months at 36 $\frac{1}{2}$ fl. and Banca s.c. at 35 $\frac{1}{2}$ fl.

Pig Iron.

Scotland shipped last week about 4300 tons, or a little more than half the quantity shipped during the corresponding week of 1895. The Glasgow market opened with business at 45 11d. cash, but the firmness soon gave place to a strong upward movement, which carried prices quickly up to 46 10s. s.c. and 47s. a month, these figures being realised on Wednesday, the market closing the same day with buyers at the last prices named. The market remained closed on Thursday and Friday, and will not reopen till Tuesday.

Lead.

shows an improvement, a better demand having arisen this week and business having taken place at 211 1s. 3d. The volume of transactions, however, has not been important. We close firm at 211 2s. 6d. to 211 3s. 9d. soft foreign, and 211 7s. 6d. to 211 8s. 9d. English.

Spelter.

The rise has made rapid strides this week, an eager demand, contracted with a paucity of supplies, resulting in business at prices beginning with 217 5s. on Saturday, and terminating at 217 15s. on Thursday and Friday. The market closes strong at 217 15s. to 217 16s. 3d. ordinaries, and 218 to 218 1s. 3d. specials.

Antimony.

The status quo has again been maintained. The quotation is accordingly still 230 to 231 10s.

Quicksilver.

First is quoted 23 15s., and second 23 13s. 6d. to 23 14s.

The following are to-night's (May 22) prices of metals:—

Copper.			
	£ s. d.	£ s. d.	£ s. d.
Tough cake and ingot	50 10 0	50 10 0	50 10 0
Best selected	51 0 0	51 0 0	51 0 0
Electrolytic Copper	51 15 0	51 15 0	51 15 0
Sheets and sheathing	57 0 0	57 0 0	57 0 0
Flat bottoms	60 0 0	60 0 0	60 0 0
Chill bars	16 18 9	16 18 9	16 18 9
Good merchantable, spot, & 3 months respectively	47 2 6	47 2 6	47 2 6
Copper tubes, seamless	0 0 7 $\frac{1}{2}$	0 0 7 $\frac{1}{2}$	0 0 7 $\frac{1}{2}$
Alloys.			
BRASS: Wire	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$
" Tubes (solid drawn)	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$
" Sheets	0 0 6	0 0 6	0 0 6
PHOSPHOR BRONZE: Alloys 11.	78 0 0	78 0 0	78 0 0
" " III. or	81 0 0	81 0 0	81 0 0
" " VII.	83 0 0	83 0 0	83 0 0
" " XI.	78 0 0	78 0 0	78 0 0
" " Vulcan brand A1	72 0 0	72 0 0	72 0 0
DURAL METAL	65 0 0	65 0 0	65 0 0
BULL'S METAL	65 0 0	65 0 0	65 0 0
Ferrobronze (Vivian's).			
Ingots	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$	0 0 5 $\frac{1}{2}$
Ordinary sheets, plates, bolts and bars	0 0 6 $\frac{1}{2}$	0 0 6 $\frac{1}{2}$	0 0 6 $\frac{1}{2}$
Screw bolts and nuts	0 0 8 $\frac{1}{2}$	0 0 8 $\frac{1}{2}$	0 0 8 $\frac{1}{2}$
Pump rods, plain	0 0 7 $\frac{1}{2}$	0 0 7 $\frac{1}{2}$	0 0 7 $\frac{1}{2}$
" finished	0 0 10 $\frac{1}{2}$	0 0 10 $\frac{1}{2}$	0 0 10 $\frac{1}{2}$
Tin.			
DELTA METAL: No. 4 (per ton)	—	—	—
" Sheets and plates (per lb.)	—	—	—
" Bars, round, square, flat (per lb.)	—	—	—
" hexagon (per lb.)	—	—	—
English, ingots, f.o.b.	61 10 0	61 10 0	61 10 0
" bars	65 10 0	65 10 0	65 10 0
" refined	66 10 0	66 10 0	66 10 0
Straits, spot and 3 months respectively	60 7 6	60 7 6	60 7 6
Australian spot, and three months respectively	61 15 0	61 15 0	61 15 0
Banco " (in Holland)	61 12 6	61 12 6	61 12 6
TIN PLATES: Charcoal, best quality	8 17 6	8 17 6	8 17 6
" " ordinary	8 10 6	8 10 6	8 10 6
" Coke, best quality	8 9 6	8 9 6	8 9 6
" " ordinary	8 9 3	8 9 3	8 9 3
These prices of tinplates are f.o.b. at Swansea: at Liverpool 6d. per box more.	—	—	—
Iron.			
Fig. G.M.B., f.o.b., Clyde, spot	2 6 10	2 6 10	2 6 10
" Scotch pig, No. 1 Gartsherrie	2 10 8	2 10 8	2 10 8
" " Coltness	2 12 0	2 12 0	2 12 0
" " Clyde	2 10 0	2 10 0	2 10 0
" " Govan	2 7 3	2 7 3	2 7 3
Bars, Welsh, f.o.b., Wales	5 5 0	5 5 0	5 5 0
Plates	8 0 0	8 0 0	8 0 0
Bars, Staffordshire, at works	5 5 0	5 5 0	5 5 0
Sheets	8 10 9	8 10 9	8 10 9
Plates	8 7 6	8 7 6	8 7 6
Hoops	5 15 0	5 15 0	5 15 0
Ship plates, Middlesbrough	5 1 3	5 1 3	5 1 3
Strait: English spring	10 0 0	10 0 0	10 0 0
" " cast	42 0 0	42 0 0	42 0 0
" Rails at works, according to section	5 0 0	5 0 0	5 0 0
Lead.			
Spanish or soft foreign	11 2 8	11 2 8	11 2 8
English pig, common	11 7 6	11 7 6	11 7 6
" " L.B.	11 12 6	11 12 6	11 12 6
" sheet and bar lead	12 5 0	12 5 0	12 5 0
" pipe	12 15 0	12 15 0	12 15 0
" red	14 10 0	14 10 0	14 10 0
" white	17 10 0	17 10 0	17 10 0
" patent shot	14 15 0	14 15 0	14 15 0
Spelter.			
Silesian ordinary brands	17 15 0	17 15 0	17 15 0
" special brands	18 0 0	18 0 0	18 0 0
English Swansea	18 10 0	18 10 0	18 10 0
Sheet Zinc	22 2 6	22 2 6	22 2 6
Antimony.			
Antimony	30 5 0	30 5 0	30 5 0
Quicksilver.			
Flasks, 75 lbs. warrants	6 13 6	6 13 6	6 13 6
Ore, c.i.f., U.K. ports	—	—	—
1st quality, 50 per cent. and upwards	0 0 11	0 0 11	0 0 11
2nd " 47 per cent. to 50 per cent.	0 0 10	0 0 10	0 0 10
3rd " 40 " 47 per cent.	0 0 9	0 0 9	0 0 9
Aluminium.			
98-99 per cent. (guaranteed 98 per cent. min.) in	Per lb.	Per lb.	Per lb.
Ingots (1 cwt. lots)	—	—	—
do	—	—	—
98-99 per cent. guarantee	0 1 2	0 1 2	0 1 2
Nickel.			
98-99 per cent. guarantee	0 1 2	0 1 2	0 1 2

SILVER EXPORTS.—The exports of silver in April from British ports were nearly twice as great as they were last year, having been worth £1,659,000 against £860,000 in April last year, and £962,000 in 1894. The expansion was due to a shipment of £600,000 worth of silver to Russia this year, whereas last year nothing was sent, and to the export of £346,000 worth to Japan, against nothing last year. France took £130,000 worth, against £66,000 worth last year; but India's purchases were valued at £268,000, against £341,000

Balaghat Mysore	G	2/3	3/9	2/6	3/1	1	0	—	0 19 C	159,945	India	8-7, Queen-street
Burma Ruby	R	3%	7%	15/16	15/16	1	0	—	0 16 0	238,551	Burmah	Suffolk House, E.O.
Champion Reef	G	7%	7%	6 1/2%	7 1/8%	1	0	4/- Apr. 29 '96	1 0 0	290,000	India	8-7, Queen-street-pl.
Colar Central	G	1 1/8	1 1/8	1 1/8	1 1/8	1	0	—	1 0 0	300,000	"	Dashwood Ho., E.O.
Comorandell	G	1 1/8	1 1/8	1 1/8	1 1/8	1	0	—	0 17 6	95,000	"	6-7, Queen-st. place.
Goldfield Mysore	G	21/8	22/8	15 1/8	15 1/8	1	0	2/- Feb '96	1 0 0	275,000	"	8-7, Queen-street pl.
Kadur Mysore	G	5/6	5/6	5/8	5/8	1	0	—	0 5 0	400,000	"	Copthall House, E.O.
Kempinkote GdFd	F	1/-	1/8	7/9	1/3	1	0	—	0 3 6	750,000	India	6-7, Queen-st. place.
Mysore	G	7%	7%	6%	6%	1	0	4/8 Mar. 12 '96	1 0 0	248,354	"	8-7, Queen-street pl.
My. Haranballi	G	7/8	1/3	7/9	1/3	1	0	—	0 18 0	100,007	"	2, East India Avenue
" Reefs	G	-7/9	8/6	8/9	9/1	1	0	—	0 19 0	160,000	"	6-7, Queen-street-pl.
West CNG	G	1	1	1	1	0	0	1/4 Jan. 16 '95	0 19 0	127,000	"	2, St. Winchester St.
" Wynand G	G	18/8	20/8	1 1/8	1 1/8	1	0	1/4 Jan. 16 '95	0 19 0	125,000	"	8-7, Queen-street pl.
Nine Reefs	G	3/8	4/-	3/8	4/10	1	0	—	0 10 0	250,000	"	8-7, Queen-street pl.
Nundvdroog	G	3%	3%	2 1/2%	3 1/8%	1	0	2/- Mar 12 '96	1 0 0	300,000	"	8-7, Queen-street pl.
Ooregum (D.O.) G	G	3 1/8	3 1/8	3 1/8	3 1/8	1	0	4/8 Apr. 15 '96	1 0 0	145,000	"	8-7, Queen-street pl.
" (15 1/2) Central	G	3 1/8	3 1/8	3 1/8	3 1/8	1	0	1/8 Apr. 15 '96	0 9 0	107,000	"	8-7, Queen-street pl.
" (15 1/2) Prof.)	G	3 1/8	3 1/8	3 1/8	3 1/8	1	0	1/8 Apr. 15 '96	0 9 0	12,989	"	8-7, Queen-street pl.
Pauang Kabang T	G	1 1/8	3/8	1 1/8	3/8	1	0	—	1 0 0	300,000	Malay Pn.	4a, Jeffroy's st. E.C.
" Corp	G	3/4	3/4	3/4	3/4	1	0	—	—	—	"	8-7, Queen-street pl.
Terrakonda	G	7/9	1/3	7/9	1/3	4/	—	—	1 2 8	157,191	Mysore ..	8-7, Queen-street pl.

AUSTRALIAN AND NEW ZEALAND MINES.

AUSTRALIAN AND NEW ZEALAND MINES—(Continued).

Name.	Closing Price, May 22, 1896	Closing Price, May 15, 1896.	Am t. of shares	When last XD and Dividend	Called up Per Share.	Amount of Stock or No. of Shares Issued.	Situation of Mine.	Head Office
W. A. General.....	4½ 4½	3¼ 3¼	1 0	—	0 14 0	—	W. Austral	28, St. Swithin's Ln.
" Australian G.F.	9½ 9½	9½ 9½	1 0	ris Mar 12 '96	1 0 0	65,000	Coolgardie	28-29, " "
" Mines D.F.	1½ ½ pm	1½ 2 pm	1 0	10/ Oct 30, '95	1 0 0	42,000	W. Austral	3, Princes Street
" Aust. Mining	9/3 9/9	9/3 9/9	5/	7½ d. Mar. '796	0 5 0	320,000	"	257, Winchester Ho.
" Aust. Pioneer.	2½ 2½ pm	2½ 2½ pm	1 0	rts Oct 19 '95	0 15 0	19,993	"	139, Cannon-street.
" Share Corp.	10½ 11½ pm	1 1½ pm	1 0	—	0 5 0	200,000	"	28, St. Swithin's in
" Venture.....	2½ 3 pm	2½ 3½ pm	1 0	15/ Oct. 30 '95	1 0 0	—	"	3, Princes Street.
West Boulder	½ 1	¾ 1	—	—	—	—	—	—
White Feather ...	2½ 2½	2½ 2½	1 0	—	1 0 0	60,000	Coolgardie	28 & 29, St. Swithin's in
Zapopan.....G	4/ 5/	3/ 4/	1 0	—	1 0 0	25,000	NW Austral	70, Bishopsgate-street
Zeehan Montana S	—	—	1 0	-4/ Dec. 95	1 0 0	66,000	Tasmania	11, Queen Victoria st
" " "	—	—	1 0	2½ Dec. 95	9 2 6	12,000	"	" "

EUROPEAN MINES.

Alamillos	L	1½ 1½	1½ 1½	2 0	1/9 Apr 15 '96	2 0 0	35,000	Spain	5, Queen-street-place
Consett Ore		7½ 7½	7½ 7½	1 0	5/- July 94	1 0 0	65,200	Spain	19, Grey-st. N'castle,
Fortuna	L	3½ 1	3½ 1	2 0	1/- Apr 15 '96	2 0 0	25,000	Spain	"
Libiola	C	2½ 3	2½ 3	5 0	4/- Apr. 29 '96	5 0 0	50,400	Italy	Dashwood Ho., H.O.
Linares	C	5½ 5½	5½ 5½	3 0	9/- Apr 15 '96	3 0 0	14,938	Spain	5, Queen-street-place,
Mason & Barry...C		1½ 3¼	3 3¼	5 0	2/ May 23 '94	5 0 0	135,172	Portugal	67, Cannon-street.
Pestareira	G	7½ 8/6	7 8/6	20 0	"	20 0	67,138	Spain	30, Queen-street-pl.
Fontgibaud	SL	21/6	21/6	20 0	11/8 Dec. '54	20 0	14,000	Coucer	"
Os Pinto	C	103½ 104½	103½ 104½	150 0	10/- Oct. 30 '93	10 0 0	325,000	Spain	60, St. Swilkin's-lane
Ripon	C	103½ 104½	103½ 104½	150 0	4½ Apl. 1, 96	100 0 0	£380,000	"	"
Sipani	C	"	"	1 0	"	0 19 0	95,000	Servia	120, Bishopsgt-st. W.
Torralis	C Su	5½ 5½	5½ 5½	2 0	7/- Apr 29 '96	2 0 0	825,000	Spain	Glasgow.
West Fru Pre pref.	"	"	"	10 0	3½ Mar. 31 '96	10 0 0	1,500	Germany	Walbrook Ho., E.O.
" Prussian Fre.	"	"	"	10 0	1½ Mar. 31 '96	10 0 0	5,450	"	"
" Prussian Or.	"	"	"	10 0	4½ Mar. 31 '96	10 0 0	14,050	"	"
Wienfahrt	"	"	"	1 ½	3½ Dec. '94	1 0 0	99,334	Prussia ..	17, Victoria-st., S.W
"	"	"	"	1 0	3½ Dec. '94	10 0	9,990	"	"

NORTH AMERICAN MINES.

Alaska Mexican...G	1 1/4 1 1/4	1 1/4 1 1/4	\$5	4-5d. Feb. '96	\$5	180,000	Alaska.....	30, St. Swithin's-in
" Treadwell G	4 3/4 5 1/4	4 5/8	\$25	1/6 Dec 14, '95	\$25	200,000	"	"
Anaconda.....C	6 1/2 6 1/2	6 1/4 6 1/2	—	—	—	—	"	"
Anglo Mexican...S	4 1/4 4 1/4	4 1/4 4 1/4	5 0	1/- Apr. 15 '96	5 0 0	74,850	"	23, College Hills
Arizona (Pref.) Cu	59/3 59/6	59/3 59/6	4 0	1/6 Feb. 13, '96	4 0 0	158,920	Arizona...	74, Geo.-st., Edinbor
" 6 1/4 Deben.	112xd	110 1/2	100	6 1/2 May. 14 '96	100 0 0	2135,300	"	"
" 7 1/2 B Deben.	99 1/2xd	99 1/2	100 0	7 1/2 May. 14 '96	100 0 0	2121,300	"	"
De Lamar.....GS	15/ 18/	18/- 18/-	1 0	1/- Feb. 13 '96	1 0 0	460,000	Idaho.....	6, Drapers-gardens.
Dickens Custer GS	-9/ 1/3	-7/9 1/3	1 0	—	0 19 9	220,000	"	Winchester Ho. E.O.
Dorio.....G	6/ 7/	7/8 1/8	5/	—	0 5 0	125,000	Colorado...	"
Elkhorn Priority S	1/4ds 1/4pm.	1/4ds 1/4pm	1 0	-73 June 26 '96	0 10 0	175,007	Montana	6, Draper's-gardens.
Gen. M'g. Assoc. ...	6 1/2 7xd	6 1/2 7xd	5 10	12/- May 14 '96	5 10 0	27,469	C. Breton	Blomfield House.
Golden Feather G	9 1/2 11 1/2	9 1/2 11 1/2	1 0	—	1 0 0	180,000	California	St. Stephens Cs E.O.
" Gate.....G	3/- 4/-	3/ 4/	1 0	—	0 19 6	79,600	"	"
" Leaf.....G	1/- 1/8	1/ 1/8	1 0	—	1 0 0	300,259	Montana	8, Draper's Gardens
Harquahala... G	2/8 3/6	2/8 3/6	1 0	-6 Nov. 14, '94	1 0 0	300,000	Arizona ...	6, Draper's Gardens
Holcomb Valley G	-8/ 1/	/8 1/-	5/	—	0 5 0	540,000	California	14, Cornhill. E.O.
Jackson Goldfields	/8 1/-	/8 1/-	5 0	—	0 5 0	408,635	"	11, Poultry, E.O.
La Plata.....GS	1/ 1/3	1/ 1/3	5/	1/3 Oct. '82	0 4 0	405,000	Colorado	11, Poultry, E.O.
La Yasca.....S	1/9 2/3	2/6 3/8	1 0	—	0 19 6	200,000	Mexico ...	20, Bucklersbury, H
Montana.....GS	7/3 7/9	7/3 7/9	1 0	-73 Mar 27 '96	0 19 0	857,158	Montana	Gresham House, E.O.
New GustonS	3/4 3/4	3/4 3/4	1 0	1/- Oct. '92	1 0 0	110,000	Colorado	25A, Old Broad-st.
Palmarejo.....GS	1/9 2/3	2/3 2/9	1 0	—	1 0 0	418,588	Mexico ...	32, Old Jewry, H.O.
Pinos Altos (D) GS	3/4 3/4	3/4 3/4	1 0	-8 Mar. '90	1 0 0	100,000	"	110, Cannon-street.
Richmond ...GSL	3/4 1 1/4	3/4 1 1/4	6 0	1/- Dec. 16 '96	6 0 0	54,000	Nevada ...	44, Coleman-street.
St. George.....	/9 1/3	/9 1/3	5/	—	0 4 9	—	G'o'gla USA	8. Geo Ho., E'cheap
Sierra Buttes ...G	3 1/2 3 1/2	3 1/2 3 1/2	2 0	-73 Apr. 29 '96	2 0 0	122,500	CALIFORNIA	133, Leadenhall-st.
" Plumas Eur. G	3 1/2 3 1/2	3 1/2 3 1/2	3 0	-79 Apr. 29 '96	2 0 0	140,285	"	"
Springdale.....G	/9 1/	/9 1/-	\$1	-72 Sep. 22, 9	\$1	1,000,000	Colorado	20, Abchurch Lane.
Twin Lake Placers	1 1 1/4	1 1 1/4	1 0	3/- Feb. '95	1 0 0	26,000	"	5, Lawrence P. H. N.

SOUTH AND CENTRAL AMERICAN MINES.

Anglo-Chilian P.N. " 6% Ryld.MH Argen.Concessions	10% 11 101 110 1/8 2/	10% 11 108 110 1/8 2/	10 0 100 0 2/	7/0 Feb. 27 '96 6% Jan. 2 '96	10 0 0 100 0 0 0 2 0	35,000 £200,000 150,000	Antofagst. S. Luis ...	123, Bishop-st. W 3 & S, Queen Street.
Caratal.....G Cayiloma.....S Colon.....G Colorado Nit.N	1 1/8 3/4 1 2/3 3/8 1 1/2 2	1/8 1/ 15/16 15/16 -13 3/8 1 1/2 2	2/6 2 0 5 0 5 0	— 1/ Apr. '94 2/8 Dec. 16 '95	0 2 8 2 0 0 0 4 0 5 0 0	1,330,000 125,000 200,000 32,000	Venezuela Peru Colombia Chili	57, Moorgate-st. E.C. 52, Lodenhall street 5, Cophthall-edge, E.C. 4 12, King-st. Liverp'l
Colombian Hy...G Coptaco.....C	3/4 3/4 2 3/4 2 3/4	3/4 3/4 2 3/4 2 3/4	1 0 2 0	1/ Jan. 26 '95 2/8 Dec. 16 '95	1 0 0 2 0 0	75,000 100,000	Colombia Chili	10, Blomfield-street Dashwood House, E.C.
Darien "A".....G " B".....G Don Pedro.....G	7 1/4 8 9 9/4 1/ 1/8	8 1/4 8 9 9/4 1/ 2/	1 0 1 0 1 0	— x.w. Apr. 20 '96	1 0 0 1 0 0 1 0 0	49,553 30,000 133,102	Colombia Brazil	Manchester. 24-5, Devonsh. C.S.E.C.
El Callao.....G Frontino & B...G Glenrock.....G Gravel.....G Guadalupe.....GS	3/4 3/4 15/16 15/16 1/9 2/3 1/8 1/8 3/8 5/8	3/4 3/4 15/16 15/16 1/9 2/3 1/8 2/8 3/8 5/8	1 0 1 0 1 0 1 0	9 1/4 Feb. '94 8d. Jan. 16 '94	5 0 0 1 0 0 1 0 0 1 0 0 1 0 0	257,600 128,562 199,948 100,000 120,000	Venezuela Colombia Arg. (& L.) Colombia Honduras	2, Bishopsgt.-st. W 18-9, Gresham House 3-5, Queen-street, E.C. 10, Blomfield-street 1a, Union-cl. Old Brd
Julia Taital.....N	3/4 3/4	3/4 3/4	1 0	—	1 0 0	105,234	Nicaragua	139, Cannon-street.
Lagunas.....N Lautaro.....N Liverpool.....G Loma.....G London Nit.....G " Nit.(Prof.)	3 1/4 3 1/4 6 3/4 7 1/4 8 8d 7 1/4 — 7/8 1 1/2 2 1/4 3 1/2 4 1/2	3 1/4 3 1/4 6 3/4 7 1/4 7 1/4 8 1/4 7/8 1 1/2 2 1/4 3 1/2 4 1/2	5 0 5 0 1 0 1 0 1 0 1 0	15p.c. Dec. '94 5/ Dec. 30 '95 15/ May 14 '96 3 1/4 Nov. '81 1 1/2 Nov. 23 '95	5 0 0 5 0 0 5 0 0 1 0 0 5 0 0 5 0 0	120,000 110,000 22,000 300,000 10,000 22,000	Tarapaca Chili	3, Gracechurch st; 70, Liverpool.
Macato.....G	1/ 1/8	1/ 1/8	2/	—	0 2 0	200,000	Peru	11, Old Broad-st. E.C.
New Tamarugal N " 8 % Cum Prof " 8 p.c. Debs ...	3/4 3/4 3/4 3/4 88 92	3/4 3/4 3/4 3/4 85 90	1 10 1 10 100 0	1s. Dec. '94 8 p.c. Feb. '95 6 p.c. Feb. '96	1 10 0 1 10 0 100 0 0	130,000 130,300 £260,000	Tarapaca "	50, Lime-street, E.C.
Orita.....G Ouro Preto....G	1/ 1/8 —	1/ 1/8 —	1 0 1 0	1/ April '89 1/ Feb. '96	1 0 0 1 0 0	30,000 80,000	Brazil	10, Blomfield-street 6, Queen-street-plac.
Pac. & Jaspampa N Phoenix.....G	1 1/4 1 1/4 -1/8 1/8	2 2 1/2 1/8 1/8	5 0 10/-	4/- May, '95	5 0 0 0 0 0	72,000 400,000	Tarapaca S. Luis ...	3, Gracechurch-st. 3 & S, Queen Street
Quebrada.....C	1 1/2 3/4	1 1/2 3/4	3 0	5% Mar. '92	3 0 0	241,956	Venezuela	2, Nicholas Lane.
Rosario.....N " (5% Deb.) " Hu'r Db Serp	5 5 1/4 104 107 108 109	5 5 1/4 104 107 106 119	5 0 100 0 100 0	5/- Feb. 13 '96 5/ April 1 '96 5% Jan. 2 '98	5 0 0 100 0 0 1 0 0	120,000 £275,000 £200,000	Chili ...	7 1/2 Old Broad-stree "
St. John del Rey G San Donato....N " Jorge.....N " Pablo.....N " Sebastian...N Santa Barbara...C " Milena.....G " Rita.....G Segovia.....G	20/ 21/ 3 1 1/4 5 3/8 2 2 1/2 1 1/4 1 1/4 3 1/4 3 1/4 3 1/4 3 1/4 4 1/4 4 1/4 —	21/ 22/ 3 1 1/4 5 3/8 2 2 1/2 1 1/4 1 1/4 3 1/4 3 1/4 3 1/4 3 1/4 4 1/4 4 1/4 —	1 0 5 0 5 0 5 0 5 0 18/ 1/4 5 0 5 0 5/-	x.rts Nov. 13 '95 2/8 May 24 '95 5/ Oct. 16 '95 5/ Oct. 30 '95 5/ May 24 '96 18/ 1/4 Dec. '96 5/- Nov. 15 '94 5/ May 24 '95	1 0 0 5 0 0 5 0 0 5 0 0 5 0 0 10 0 0 5 0 0 5 0 0 5 0 0	327,656 32,000 75,000 32,000 23,000 22,000 20,000 120,000	Brazil	Finaby Ho., Blm'd st
Tolima "A".....G " B".....G	5 8 4 1/2 5 1/4	5 8 4 1/2 5 1/4	5 0 5 0	5/- Mar. 12 '96 5/ Mar. 12 '96	5 0 0 5 0 0	14,000 6,000	Colombia "	12, King-st. Liverp 9, Gracechurch-st. Dashwood House E.C. 5, Cophthall-building

MINES INSPECTION IN SOUTH STAFFORDSHIRE.—The report of Mr. W. B. Scott, Inspector of Mines for the South Staffordshire district, has just been published as a Blue Book. What is known as the South Stafford mining district comprises the half of the county of Stafford south of the rivers Sow and Trent, and the line of the London and North-Western Railway from the town of Stafford to Newport, and the whole of the county of Worcester, for the purposes of the Coal Mines Regulation Act, together with the counties of Essex, Norfolk, and Suffolk, for the purposes of the Metalliferous Mines Regulation Act. 26,715 persons were employed above and below ground during 1895, which is less by above 1200 persons than those employed in the preceding year. The cause of this reduction may be summed up in one phrase, "bad trade." The females employed above ground were slightly reduced in numbers. The output of minerals was 8,953,123 tons, the amount of coal raised being 8,648,693 tons, and of freighting 260,956. Compared with 1894 this is a reduction of half a million tons. In proof of the bad trade which has been a persistent feature throughout the year in this inland coal field, Mr. Scott points out that only in two preceding years since 1873 has the output been lower—namely, in the year 1874, which is a lengthy strike record, and in the year 1886, which was a year of very bad trade in the district. The number of mines at work was 349, of very varying size and depth. The total number of fatal accidents amounted to 36, and the fatalities resulting therefrom to 41. This is comparatively a favourable record, considering the history of the district, for only in four previous years has a lower number of fatalities been recorded, viz., 1885, 1890, 1891, and 1892. It is not, however, so satisfactory to consider that the death rate for South Staffordshire stood at 1·790 deaths per 1000 persons employed, whilst a neighbouring district has so low a ratio as 0·649 in 1903 persons in the year 1894. Mr. Scott emphasises that which had been frequently laid down by his colleagues and himself, that safety-lamps should alone be used under suspicious circumstances where fire-damp may be reasonably expected to show itself. As illustrating the objection which workpeople have to use safety-lamps, Mr. Scott mentions that towards the close of the year two men were injured by an explosion of fire-damp in the new mine seam of the Blakely Wood Colliery. During the night shift fire-damp had been found in a "waste," but nothing had been done to ventilate it, and these two men had been allowed to work near the mouth of this waste with naked lights. The fire-damp was driven out of the waste by a fall of roof, and igniting at the lights of the men, they were burned. The owner was proceeded against, and these two men had to give evidence to establish these facts. They declared, in spite of what they had suffered, that they would run the same risk rather than work with safety-lamps, and if forced to do so they would leave the pit, and that it was impossible to work with safety-lamps. The stipendiary magistrate found himself compelled to comment upon this phase of the men's feeling. The owners were fined for not ventilating the waste and for not using safety-lamps. And yet the men did not want them. During the year 303 visits were paid to mines without complaints or accident having drawn attention to them. 443 mines were visited, and 112 accidents were investigated.

REPORTS FROM THE MINES.

BRITISH MINES.

TINOCROFT.—May 15: We are cutting the plat at the 362 fathom level in Martin's east shaft. In the 330 fathom level driving west of tin, and worth £10 per fathom. In the 270 fathom level driving east of Martin's east shaft the lode is worth for tin £8 per fathom. In the 234 fathom level driving west of Martin's east shaft on the north part the lode is worth for tin £15 per fathom. In the winze sinking below the 234 fathom level the lode is worth for tin £8 per fathom. We hope to communicate this winze to the 258 fathom level during the next four weeks. In the 282 fathom level crosscut the north and west of Martin's east shaft we are cutting through the south part. The lode is large, and worth for tin £7 per fathom. In the 315 fathom level driving west of crosscut, west of downright shaft, the lode is 10 fathoms wide, the part now driving on being worth for tin £12 per fathom. In the winze sinking below the 190 fathom level the lode is worth for tin £8 per fathom.—North Tinocroft. We have nothing to report below the 142 fathom level. In the 120 fathom level driving east of Willoughby's shaft the lode is very highly mineralised, and worth for tin, arsenic, and copper £15 fathom. In the rise in the back of this level the lode is worth for tin, arsenic, and copper £14 per fathom. In the winze sinking below the 100 fathom level the lode is worth for tin, arsenic, and copper £14 per fathom. This ground will be available for stopping in a few days. In the winze sinking below the 90 fathom level east of Willoughby's shaft the lode is worth for tin £8 per fathom.—West Tinocroft. We have got through the run in the engine shaft, and made it secure. The shaft men are now engaged in fixing the angle bob at the 70 fathom level, after which we shall have to refix the 80 fathom lift, which will be done with all speed. In Williams' shaft there is no change worthy of notice. (Signed) Wm. Teague, John Hamill, Geo. Nancarrow.

WEARDALE LEAD.—Groverake. 69 fathom level east sparry vein about the same for ore, worth 4 cwt. per fathom. Tribute ore for the week returned at 14 bins.—Boltsburn. Watt's level, stopes in north flat, worth 30, 30, and 26 cwt. per fathom. Stopes in south flat worth 10, 30, 26, 26, 18 and 16 cwt. per fathom. Vein stopes worth 16 and 12 cwt. per fathom. Proving north flat below level, the ore seems to be going down, but is very hard and slow to work, worth 24 cwt. per fathom.—Greenlaw. Rases drift, the vein continues about 4 feet wide, worth 14 cwt. per fathom. Stopes 16 and 12 cwt. per fathom. Lowe's drift vein a little divided, worth 8 cwt. per fathom. Stopes worth 14 and 12 cwt. per fathom. Quarry level we are still cutting over to the south part, and taking one side, the poor worth 8 cwt. per fathom. Stone finished, worth 8 cwt. per fathom.—Sedling. Driving 64 level east, strong vein looking rather better. Stopes above worth 10 and 12 cwt. per fathom. Driving west in north branch at the random of 56 level, vein 3 feet wide, of spar and stone mixed with ore, worth 8 cwt. per fathom. Stopes above 56 level worth 12, 12, 10, 12, and 16 cwt. per fathom. Ore raised for week 54 tons, ore dressed for week 42 tons. Ore and slag smelted for the week 77 tons, producing 40 tons of pig lead.

COLONIAL, INDIAN, AND FOREIGN MINES.

MOUNT ZEEHAN (Tasmanian) SILVER LEAD.—Manager reports for week ended April 7.—Silver Queen section No. 8 lode, No. 2 level, Winze on south west part of lode has been sunk 4 feet, total 58 feet below the sole of No. 2 level.—Concentrator has been running on ore from tributors and Zeehan-Montana Company.

WEMMER.—Report for the month of March:—Expenditure and revenue.—Expenses: Cost, mining £5518 15s. 5d., cost per ton, £6 3s. 6d.; transport, £255 8s. 9d.; 9-056d.; milling, £1477 15s. 8d.; £4389d.; concentration, £286 15s. 10d., 10-167d.; cyaniding, £233 16s. 5d., 2s. 9-74d.; general charges, £562 14s. 2d., 1s. 7-948d.; maintenance, £33 8s. 1d., 1-184d.; redemption, £2369 10s., 7s.; total £11,428 4s. 4d., 33s. 9-136d.; profit for month, £6,680 0s. 7d., 10-811d.; total, £18,108 4s. 11d., 53s. 5-947d. Revenue: Gold from mill, 3,498-90 ounces, value per ton, £12,770 19s. 8d., £37 8-737d.; gold from cyanide, 1,041-03 ounces, £3,445 5s. 3d., 10s. 2-137d.; gold from concentrates (estimated), £1,892, £1,892, 5s. 7-073d.; total £18,108 4s. 11d., 53s. 5-947d. The cost per ton is worked out on the basis of the tonnage milled.—Capital expenditure. Development, 523 feet 6 inches, driven, sunk, and risen, £2138 13s. 3d.; main shaft, £395 11s. 2d.; buildings and improvements, £612 9s. 8d.; machinery and plant, £1348 13s. 10d.; total £4495 7s. 11d. Less development redemption, £2319 10s.; total, £2175 17s. 11d.—Output. Mill, 3,498-90 ounces; cyanide works, 1041-03 ounces; concentrates (estimated), 661-50 ounces; total, 5201-43 ounces.—Credited during the month. South reef, 2604-419 tons, 38-47 per cent; main reef leader, 4165-581 tons, 61-53 per cent.—Mining and development. Feet driven, sunk, and risen, 523 feet 6 inches; ore opened up by development, 9959 tons; ore mined, 9262 tons; clean ore for the mill, 6519 tons; waste picked out, 2743 tons.—Reduction. 50 stamps run 29 days, 12 hours, 43 minutes. Ore milled, 6770 tons; duty per stamp per day, 4-585 tons; yield of bar gold, 3,498 90 ounces; yield per ton crushed, 10,336 dwts.—Cyaniding. Tailings treated, 4875 tons; yield of bullion, 1,041-03 ounces; yield per ton treated, 4-270 dwts.—Concentration. Tonnage milled, 135 tons; average assay value, 4-90 ounces; fine gold per ton of ore milled, 1-954 dwts.—Yield (fine gold) per ton treated. By amalgamation, 9-024 dwts.; by concentration, 1-954; by cyanide, 3-360, total extraction per ton, 14-338 dwts.—Dividend No. 12. A dividend of 50 per cent. was declared on March 26, payable to shareholders registered on March 31, and will be paid in the early part of May, 1896.

LA YSCOA GOLD AND SILVER.—The manager in his report, dated April 2, says:—El Progreso winze producing fair quality of ore. We are working for pumping and driving to south east on bunch of ore that promises well. Footwall vein has struck into old mine which is deeper than crosscut. On driving on this vein towards El Progreso and encountered bunches of pay ore. Extension of crosscut to hanging wall has not yet reached the vein on that side. In San Luis, which is on hanging wall, am driving in both directions, about 100 feet. Shipped on 20th 134 tons concentrates assaying 330 ounces per ton, on 23rd a further 234 tons concentrates assaying 3094 ounces per ton. In a recent cable he says the workings showed considerable improvement, and it is hoped in a short time he may be able to extract sufficient ore to keep the mill running continuously, in which case there should be a considerable margin of profit. He has effected an improvement in the mode of treatment, and the returns from the Mint of recent crushings have given higher results both for silver and gold, the last return for gold being 42-65 per cent.

CENTRAL MENZIES.—The manager reports that all the necessary legal formalities relative to the transfer of Lease 1433, known as the emulatur to this company, have now been completed. Shafts No. 1 and 3 have been sunk to a depth of over 100 feet, and a crosscut put in at the 100 feet level connecting the two shafts. Shaft No. 4 (underlay) has reached a depth of 32 feet, showing formation 18 inches wide with small leaders in it. In the crosscut between shafts 1 and 3 at the 100 feet level, and at a distance of 121 feet west from No. 1 shaft, a drive has been put in to the north a distance of 15 feet, showing formation 12 to 15 inches in width, assaying from 6 dwts. to 3 ounces 6 dwts. 14 grains. To the south the drive has reached a distance of 9 feet. Formation 18 inches wide, with quartz leaders, assays 11 dwts. 12 grains.

GRILL CONCENTRATIONS AND EXPLORATION.—Mr. Hackett, the company's manager reports as follows: No. 1 Talisman Kurnalpi, Lease 2100. Shaft No. 1 (underlay) 21 feet deep, width of reef 6 inches, assaying 8 ounces 14 dwts. 7 grains to the ton. Shaft No. 2 (vertical) 52 feet deep, from the bottom of which a crosscut has been driven, cutting reef in the underlay at 21 feet. Shaft No. 3 (underlay) 23 feet deep, showing solid reef 1 foot 4 inches wide, increased in gossanous limestone 4 inches wide. Reef assays 8 ounces 14 dwts. 7 grains per ton.—Shaft No. 4. Main reef 71 feet deep. A crosscut has been driven cutting the reef at 16 feet, disclosing reef 16 feet wide, assaying 1 ounce 2 dwts. 12 grains.—Lease 2099. Shaft No. 5 43 feet deep, width of reef 2 feet, assaying over 1 ounce to the ton. Shaft No. 5 51 feet deep. Drive in 16 feet on reef 3 feet wide.

THE DAY DAWN BLOCK AND WYNDHAM GOLD MINING COMPANY (LIMITED) has sold through Messrs. Johnson, Matthey, and Co. (Limited) consignments of bullion ex s.s. *Junonia* and *Harvest* for £18,856 9s. 8d. The company has also declared an interim dividend of 6d. per share, free of income tax, payable June 11 to all shareholders registered on May 28.

CENTRAL BOULDER (W.A.).—Mine manager's report for fortnight ended April 8: Main shaft sunk a further depth of 22 feet, the total from surface being now 80 feet. The contractors have also timbered the shaft from the 50 feet level to the surface, and centred off the pump division. With the ground remaining favourable as at present, the first 100 feet will be about completed by the end of the next fortnight. I will then cut a plat and drive to connect with No. 1 shaft at the 100 feet level.—No. 1 shaft. Have completed all necessary timbering and fixed ladders in position down to the 100 feet level. A chamber has also been opened at this level and driven 10 feet. It is 12 feet wide, and the whole of this width is in lode matter with no walls showing on either side. A body of good grade stone 2½ feet wide is showing in the end of the chamber, and I propose carrying the drive along this ore body. The stone now being broken is not of the same quality as that taken from the bottom of the shaft, but is however good payable dirt, and will in all probability improve as development proceeds.

GREAT TALUNGA.—On February 4, Mr. Field writes to say: We have been inspecting the property, and find that this section is nothing but parallel reefs running in conjunction with main lode, by the indications of their outcrops, and I have no hesitation in saying that they will nearly all carry gold. Writing February 11, Mr. Field, speaking of what he proposes doing, says: I propose to concentrate the sand as much as possible, say up to 6 or 7 ounces per ton, or more, which I could do with the necessary machinery, and then send the concentrates to be treated by cyanide or Haycraft process, whichever one can turn out the best results. By this means it would save a considerable extent in erecting the different plant, as it should not cost much to treat a few tons of the concentrates, and would then leave us a very good profit as freight is cheap either to Mount Torrens or Adelaide. A little later on in the same letter he says, speaking of the Western shaft: We have decided to put two men on timbering and making this shaft secure, as it is a very promising looking lode, composed of white quartz intersected with strings of kaolin and oxide of iron, and samples taken from here show in panning a very fair colour of gold. As this shaft is only about 100 feet where the ironstone reef ought to intersect the main lode, we think it is as well to prospect on this a little, so as to be able to get a supply of mineral independent of main shaft, and we could start crushing as soon as the mill arrives. Writing on March 3, Mr. Field says of the Western shaft: This has been driven for the past week 8 feet from western end of shaft, on the course of the lode, which is fully 6 feet wide, and can see free gold right through by washing samples, and we have on surface about 10 tons hard quartz and about 15 tons of a mixture of kaolin and quartz, which is not so good; but, however, I am of opinion that this will all pay to go through our own mill. A little later on he says of the No. 3 old shaft: The more places that can be opened up on the lode the better we can keep up a supply of mineral, so that when once we start the mill we can keep her going, and if the mill was here now we could commence crushing at once, which ought to pay very well. On March 5 Mr. Field cabled as follows: Incline shaft driving west. The lode carries gold in paying quantities. Writing on the 10th, he says: Since we have opened up the western shaft, there has been a great rush to the Government reserve to peg out claims anywhere in the line of our reef, and also all the adjoining private property has been bought up by large syndicates. This I am sure ought to show the directors and shareholders what the people in this country think of this property; and I am worried with visitors daily, who come from all parts to see the Black Snake Mine, as it is locally known, and I may say that all South Australia have their hopes on this mine. The neighbouring property two sections off east, called Scott's reef, is turning out splendid samples of free gold, and they have made quite a stir in Adelaide, where they have been on exhibition. A little later on, in the same letter, he says: Everything is being carried on in a proper and satisfactory manner, and we are only waiting for the machinery, so as to be able to make a good start, and the more I see of this section the more I am convinced that the company have a magnificent property, to last them a number of years, and paying handsome dividends all the time. Enclosed with the same letter is a report to Mr. Field by Mr. Michell, detailing the week's work, in which he says: "We have driven west on course of the lode from bottom of shaft 17 feet by two men and firmly timbered same. The lode averages 5 feet wide, and is of a very promising nature, producing free gold. Some samples washed from footwall gave very good results, and some from hanging wall showed that the whole lode will pay to go through the battery when it is fixed. There are 40 tons of lode stuff now at grass ready for crushing. I mean to keep on driving west, as the shoot of gold seems to be dipping in that direction. I consider this a fine discovery, as it is a different shoot from that in the main or engine shaft, and the lode being large will turn out a lot of payable rock for milling, and no fear of meeting water at this depth, and I think we could safely sink another 20 feet before striking water. In a letter of the 17th Mr. Field says: I shall be very glad when the machinery arrives. What we want most is a mill, although for the short time we have been here everyone is surprised at what work we have got through. Later on, in the same letter, he says, speaking of the western shaft: We are now driving east and west on the course of the lode, and samples taken from the western end from the foot and hanging wall sent to the Government assayer, and they assay as follows. No. 1 footwall, consisting of quartz, mundie, and oxide of iron, 1 ounce 7 dwts. 18 grains. No. 2, or hanging wall, composed of kaolin, quartz, and oxide of iron, 9 dwts. 3 grains, of an average width of 5 feet, so you see it would all pay to run through our own mill; both ends are looking well, and we are sending a 10 ton sample to be crushed at the Mount Torrens Cyanide Works. On March 24, speaking of the sample sent to Mount Torrens, Mr. Field says: I will be going over there to-morrow to see what time they can crush for us. At first I did not intend to send any quartz over there, but on the results of the samples sent over, which were taken from right across the lode, I then decided to send a sample for treatment, as even if it only turned out ½ ounce per ton it would pay us handsomely, as up to now we have not had to use any blast ing material, only gadding it out, which means only the cost of labour, candles, wear and tear of tools in use, and with a 10 stamp battery I am certain that we could almost keep her going from this shaft alone. In the same letter, speaking of the large ironstone reef, Mr. Field says: I am of opinion that it will pay to sink on it, but at present I think we have quite enough opened to guarantee us working for a number of years. A later letter from Mr. Field explains that the machinery (consisting of pumping and hauling gear) which was despatched from England some months ago had at length arrived, and that, as they had already prepared everything for its erection, such as foundation, masonry, &c., it would be erected in a few days.

LONDON AND WESTERN AUSTRALIAN INVESTMENT.—According to mail advices just received from Cue, the extensive buildings of the above company in that town have now been successfully completed. They comprise an hotel, a club building, offices and shops, all constructed of stone, and for the tenancy of which there has been keen competition. The hotel has a frontage of 140 feet to Darlot-street and 66 feet to Austin-street, and is acknowledged to be the best on the Murchison, being very commodiously arranged and fitted with the most modern improvements, full provision having been made for the continued rapid growth of the town. In the office building (the Murchison Chambers) all the leading firms operating in the district are already located, including Messrs. Alex. Matheson and Co., the energetic agents of the company in West Australia. The buildings are quite the feature of the town, and, being the first of their kind in the field, they will doubtless prove as remunerative as the similar investments of the company in the principal towns of the colony.

MURCHISON UNITED.—The latest mail advices from the mine superintendent are dated Cue, April 13, at which date the crosscut from the vertical shaft of the Lily mine had not intersected the reef, the cutting of which has, as already published, been announced by cable. At the first mentioned date a crosscut at the 191 feet

level had been put in a total distance of 29 feet. Had the reef kept its natural angle, we ought to have cut it at 25 feet. I do hope we may cut it good and drain the winze at the 100 feet level, so as to open up sharp. On March 23 water came up in the winze, and we can do no more until the reef is cut below and drains it. The last 2 feet of the reef broken in winze is good-looking quartz showing fair visible gold, and pans over 2 ounces. The reef in winze is thicker and more uniform than anywhere else in the mine, and I am sorry we were compelled to knock off there. When we cut the reef I shall hope to proceed with the winze as fast as possible.—Crushing. We started at the Otis mill at midnight, March 29, on the 25 tons quartz so long stacked there. The yield has been 34 ounces of retorted gold, a little better than I expected, the ore having been the cleanings up of the old A shaft dump, and some mixed stuff from B shaft. I shall get the 25 tons of ore from the stope and winze put through the public battery this week. The result of this latter crushing, as previously advised by cable, was 97 ounces gold, equal to a yield of nearly 4 ounces per ton.

NIEKERK (Klerksdorp).—Manager's report for week ending April 25: No. 1 winze. Incline, total 100 feet; drive east 4 feet, total 72 feet; crosscut 11 feet, total 85 feet; one pair 15 feet rails laid.—No. 11 winze. Incline 7 feet, total 80 feet. Drive west, two sets of timber placed; drive east, two sets of timber placed. Head gear and whim being completed. Skips commenced running during week, and sinking was restarted. Rails of old tram taken up and new tram now being laid from head gear.—No. 3 winze. Incline 6 feet, total 49 feet. One set of timbers placed.—No. 1a winze. Incline 10 feet, total 34 feet. One set of timbers placed. Total driven in week, 15 feet; total sunk, 23 feet; total sunk and driven, 38 feet.

OMELO (Victoria).—The following is from the mine manager's report:—I have extended drive on western reef 8 feet, total from main tunnel 26 feet. Country passed through schist and sandstone. North drive extends 6 feet, total 150 feet. Country in face nice soft sandstone and dyorite reef, 4 feet wide, carrying fair gold. Lena reef tunnel extended 12 feet by contract, total 110 feet. Ground passed through schist. Some very rich veins coming in, expect to strike the shoot any day. Winze on Lillie sunk 6 feet, total 29 feet, reef looking well. Starting to drive a tunnel up the line of the Lillie reef. I have great faith in striking a good reef in the main tunnel before very long.

PESTARENA UNITED.—Monthly report of Messrs. W. H. Trelease and T. H. Mesa:—Ende, 33 east on No. 2. The lode has somewhat decreased in width, and now averages 30 centimetres of quartz and pyrites. Its value is estimated at 3 tons of 1 ounce ore per fathom. The branch in the 46 east on Pozzone lode has given some good stones of ore during the month, and has now an average width of 20 centimetres carrying quartz and pyrites. Estimated value 2 tons at 1 ounce. The lode in the 46 east on caunter is wide in the roof, but split in two by a horse of mountain in face of end. Its average width is 30 centimetres carrying some good pyrites, while it is estimated to produce 2 tons of 1 ounce ore per fathom. A fine lode is now being driven on in stopping forward the 46 east of No. 1, of quartz and pyrites, the latter predominating, its estimated value being 5 tons of 3 ounces 10 dwts. ore per fathom.—Crosscuts. No changes of any importance are to be recorded, either in the 33 north, 55 south, or the 70 north, or 90 south (Acquavita) since the last report was despatched. Stopes are quite equal, both in the quality and quantity of ore produced, to when last reported.—Staboli Mine. The crosscut west from Morghen adit is now in hard, dry, compact schist.—Kint Concession. End west on Oro Secco. The lode continues 2 metres in width, and is estimated to produce 15 tons of low grade ore per fathom, and from 8 to 10 tons that would pay to mill. The end east on Depaulis lode is 1-50 metres wide, but carries no mineral, not yet having reached the ore shoot. The lode in the Quarazza winze is carrying about 15 centimetres of ore, while fair progress is being made in sinking.—Pomone Pamp. The bucket lifts have been changed twice, and a bolt of one of the bearings broke on 11th inst. These delays, with very heavy rains during the first 10 days of this month, have caused the water to rise 5 metres, the total depth now being 27-10 metres.—Machinery. Continues to run satisfactorily.

WEST KALGURLI.—The following is from the mining manager's report: Lease No. 1991, old No. 518. We have cut, squared, and fixed timber at foot and mouth of drive; this part being so very shaky has had to be thoroughly timbered. Have sunk shaft a further distance of 6 feet, total depth 46 feet. The country is now more settled, and is extremely hard. All work has to be done with hammer and gads. The outlook of the country is very promising, quartz leaders and veins of quartzite heavily stained with copper constantly coming in. I have to report a very rich find situated about 350 yards south of this lease, and which, if it lives, will run straight into this line of reef, about 120 yards east of the new shaft. This formation being estimated at 50 ounces to the ton ought to improve the value of this property.—Lease No. 2213, old No. 438. Have cut and squared a set of 6 inch timber for month of shaft. Sunk shaft 10 feet further, total from brace 31½ feet. A small outcrop on cross reef has opened up a very nice looking reef.

WEST BOULDER.—Mine manager's report for fortnight ended April 8: Block 888. No. 1 shaft east crosscut has been extended 18 feet, making a total from shaft of 36 feet. The face of crosscut is now in country rock, having passed out of the lode at about 20 feet. The transition from lode to mallock was very gradual. The ground is very favourable for working, so that the crosscuts to connect No. 1 and No. 3 shaft will be completed in a very short time. Tenders for driving this crosscut a further 160 feet close the end of the week, and the contractors can start immediately. I anticipate getting the whole of these crosscuts driven at a very cheap rate.—No. 3 shaft. The contractors have completed timbering up to within 23 feet from surface, this amount of ground having been sunk previous to letting the contract. I have had day men engaged in securely timbering this 23 feet, and also in sinking the shaft a further 10 feet, to correspond with the 100 feet level in No. 1 and No. 2 shafts. A whip has also been erected, and the shaft is now ready to start crosscutting west towards No. 1 shaft. The tenders for driving this crosscut close on Saturday, the 11th inst. Should the Ivanhoe reef extend and continue in its true course, I expect to have important developments to report from either this or the east crosscut from No. 1 shaft.—Block 1168. No. 2 shaft east crosscut has been driven 26 feet, making a total distance from shaft of 59 feet. The character of the rock remains unchanged.

SALISBURY-MURCHISON.—Cue, Western Australia, March 28: The crosscut referred to in my last monthly report has been connected with the central shaft, giving good ventilation. Drives both north and south have been commenced, and I am now raising stone for a trial crushing. The assay of a sample of stone taken from the 50 feet crosscut at this point of intersection with the central shaft is 5 ounces 11 grains. The main prospecting shaft or engine shaft, on the Agamemnon property, has cut through the lode at a depth of 116 feet from the surface. Reef about 4 feet wide, showing gold in the stone, and from which I have washed prospects equal to 2 ounces per ton. The winze being sunk in 50 feet level—Tasmania property—an opaline formation had cut out the reef towards the North Agamemnon property. This forecast has proved correct so far. There is nothing payable discovered in the new shaft at A, although 46 feet have been sunk—in fact, no gold has been found, and I suggested in my last letter that it would be good policy to draw the men off from A, and put them in the Agamemnon main shaft to hasten the work in that direction. Please confirm or cancel this action in your next letter. When I went down E shaft for the first time on my arrival on these mines I pointed out an intrusive rock formation, where it crossed the reef at a depth of 80 feet from the surface, to Mr. Harvey, and I then expressed the opinion that it would kill the lode from thence towards the North Agamemnon. I have seen nothing since to cause me to alter this opinion. If there is any gold in that direction it will be found deeper down than at any point we are looking for it. The lode in the winze (Tasmania) is widening out, it is now 5 feet thick, but the hanging wall stone is not so rich as the footwall.—(Signed) E. Wattie, manager.

ARROW PROPRIETARY GOLD MINES.—Mine manager's fortnightly report to April 8:—Oaul section: Foucher's shaft. The 100 feet drive north extended to total 217 feet. Lode increased in size and yield owing to its approach to Brookman's shaft, where it is 24 feet wide. Shall resume sinking this shaft, and hope to intersect water at 20 feet.—Brookman's shaft. The 100 feet level north communicates with south drive from main shaft, giving good ventilation and opening this part. Started crosscut east from this shaft to intersect Barrow's shaft, and lode is advanced 14 feet. When Barrow's shaft is required depth, shall crosscut west from it to hole with this drive. The winze sinking from 60 feet level has holed with crosscut west at 100 feet level, the lode for the whole depth producing gold in paying quantities.—Main shaft. Owing to south drive communicating with Brookman's shaft there is nothing special to mention. Barrow's shaft sunk to total of 80 feet, and the shaft had to be timbered owing to heavy rains, thus causing decrease in speed of sinking.—(Signed) William Hamby.

ASSOCIATED GOLD MINES OF WESTERN AUSTRALIA.—Australia (Block 38e). Drive north at 80 feet level extended to total 32 feet 6 inches, carrying part of reef and intend crosscutting.—Adelaide (Block 103e). Shaft No. 4 crosscuts east and west sinking to each crosscut. West crosscut extended to total 31 feet; no change; ground composed of red schist. East crosscut extended to total 33 feet. Hard bar of ground cut through, and test lode intersected, appearance characteristic of Lake View line of lode.—Australia E Block (72e). Shaft No. 2. Crosscut driven to total 29 feet.—Shaft No. 6. Sunk to total 46 feet. 10 feet timbered. Ground both in crosscut and shaft excessively hard.—Lake View Extended Block (101e). Shaft No. 3. Crosscut east and west continued. West crosscut extended to total 45 feet. East crosscut extended to total 61 feet; no change.—Shaft No. 4. Crosscut east and west continued. West crosscut extended to total 29 feet. East crosscut to total 28 feet. Lode formation not yet cut through, but 60 feet opened up. 20 feet east of shaft driving on lode south started, fair gold obtained.—Shaft No. 5. Drives on crosscut reefs extended. West drive to total 50 feet east drive to total 65 feet, where quartz is broken up, but lode material keeping the course. West drive carries iron and quartz formation 1 foot in width.—(Signed) Wm. Oats.

BAYLEY'S REWARD No. 1 SOUTH.—The manager writes under date March 30: The plates look extremely well, and we anticipate another good crushing for this run at any rate. We are now running three shifts full time 5 heads. In the south drive at the 90 feet level south again from Whip shaft we have started a crosscut in the east end, and may have to go some distance, but I am confident of subsequently cutting the reef again past the break met with at the Whip shaft. On the surface the reef can be slightly tracked by loose lying quartz, and some very nice rich specimen quartz was originally got there by the dry blowers. If we can open up a good block of ground here, it will give new life to the mine all round.

BREMNAES GOLD.—The following report has been received from the mine, dated Haugeund, May 18: Risvig Mine. In the 400 north level, the lode is nearly 4 feet wide, with about 10 inches quartz. Stopping in back of same level the quartz shows a width of 3 feet, about one half of which has gold value 5 dwts. per ton. The rise and stope in back of 300 north level has quartz 10 inches wide. The quartz contains a little iron pyrites, and has panned gold. There is no change in the 200 south level, except that the quartz carries less mineral.—Fladenes Mine. In the end driving north from winze the lode is 4 feet in width, with quartz averaging 15 inches. The quartz is of good quality, contains copper and iron pyrites, and shows fine gold by panning. In the end driving south the quartz is 3 feet wide, carries a little copper pyrites, and has value 6 dwts. gold per ton. The stopes in back of these levels produce quartz of same width and value as respective levels.—Galeskold Mine. The lode in the stopes in upper north level is 4 feet between walls, with quartz averaging 10 inches wide; same contains galena, and visible gold has been met with.

COLOMBIAN HYDRAULIC.—April 16:—Operations during run No. 207. Owing to the small quantity of gravel left by the Spaniards there has been great trouble in working, and though the gravel is very good, the returns will be low for the present, owing to the want of mud to carry off the old tailings, and the large area over which the gravel is spread. The 22 inch pipes have been carried over to the south side, and in about 20 days we expect to be able to use them; the mine will then be working to greater advantage.

EAGLE'S NEST.—Report for month ending March 31: Fig Tree Creek. First level driven 14 feet 6 inches, total length 114 feet 1 inch. Width of reef 2 feet. Assay value 4 dwts. 8 grains. Third level driven 2 feet 9 inches, total length 262 feet 9 inches, in broken ground showing traces by assay.—Moonstone. The original drive has been widened 125 feet, total length 288 feet, where it intersects the second reef in the drive 3 feet wide. Assay value 12 dwts. 7 grains. We shall now drive east and west on both reefs.—Oratava end. First level driven 50 feet, total length 127 feet 10 inches. Width of reef 1 foot 6 inches. Assay value 2 ounces 6 dwts. 3 grains.—South reef, second level. 35 feet driven, total length 149 feet. Width of reef 2 feet. Assay value 7 ounces 12 dwts. 17 grains. We are still driving on the rich shale of gold mentioned in my last report. Third level driven 24 feet, total length 288 feet 6 inches. Width of reef 2 feet 6 inches. Assay value 18 dwts. 4 grains. Reef about the same.—Prospecting (Moonstone). Three surface cuttings were made on the approximate line of these reefs, total length 169 feet, but without any satisfactory results as yet.—Leader (west end). 25 feet 6 inches were driven on this leader in a prospecting drive. Average width of leader 12 inches, assay value 6 ounces 12 dwts. This leader has been further exposed in Block 4 about 100 feet west of shaft. Width 2 feet, assay value 18 dwts. Total length of prospecting cuttings west end 109 feet. Total feet driven 276 feet 9 inches. Total length cuttings 277 feet. Average fire assays of reefs taken during the month 2 ounces 14 dwts. 19 grains.—New buildings. These are in the course of erection, and I anticipate will be completed about the beginning of next month.

EAST NIGEL.—The following report from Mr. Banon, the manager, is to hand.—Report for the fortnight ending April 25.—No. 3 incline has been sunk a further depth of 12 feet 6 inches, making the total depth 113½ feet. The rock is extremely hard.—No. 2 incline. Am excavating for the boiler foundations and will start these at once. The boilers for the battery are now being erected; the mill engine is already erected. We have plenty of boys now for surface work, but good drill boys are scarce.

GREAT BUNYONG ESTATE.—Ballarat, April 13: At the alluvial shaft preliminaries preparatory to putting up pumps about completed, and commencement to lower the lift will be made tomorrow. At the quartz shaft 100 feet level chamber constructed, and arrangements complete for crosscutting east and west; both have been commenced.

HANNAN'S OROYA.—Mine manager's fortnightly report to March 25:—Oroya. Main shaft 107 feet level. East crosscut. Extended 21 feet, total 68 feet. Have driven through the lode 25 feet, but this is at an angle; should judge that it would be 15 feet direct across. The lode carries gold right through, have started to drive south on the course of the lode, nice gold is showing in face of drive.—Western crosscut. Extended 17 feet, total 28 feet, the ground is becoming easier to work; have cut a leader about 9 inches in width, which is carrying gold. This shaft is being divided to make proper footway, and I am also making preparation to erect a store room on this lease, so that any very rich stone may be bagged and stored away.—Royal Mint west. No. 1 shaft. Drive on leader has been extended 12 feet, total 32 feet, there is no change to report, shall drive north to ascertain the value of lode in that direction.—Prospecting shafts. In respect of trial shaft, advised in my last report, as having been sunk 6 feet, this has been continued 12 feet, totalling 18 feet, good prospects still obtainable by water assay. Another shaft on same lode, and about 150 feet north of the previous one, has been sunk 12 feet, the lode is 2 feet wide, carrying gold, has every appearance of making in width as depth is obtained.—(Signed) Wm. Oats.

HANNAN'S STAR GOLD MINES.—The latest mail advices received from the mine superintendent are dated April 11, and give the following information:—Donoughmore's shaft: The new name

given to what has previously been called the main shaft has been sunk to a total depth of 110 feet from surface. The ground is exceedingly hard diorite. The south level from the crosscut in this shaft has been extended to a total distance of 52 feet. Vein of stone which we had had out, but the hanging and footwall of the formation still continue. The ground is coming in very regular, being brown slate and quartzite, and is better for working. This level will reach the underlay shaft in the course of another month, when I shall be enabled to place nine men in the shaft, and push it ahead as fast as possible. Since the Boulder Main Reef Company cut the lode, I am in a better position to form a correct opinion and judgment of the course of the Boulder lode formation. Hence the reason of my advising to sink Donoughmore's shaft deeper. This shaft is not in the best position for a main engine shaft, being too near the southern boundary. It will come in for a working and air shaft, and when the lode is struck work and stoping can be carried on during the time the main engine shaft is sinking.—Underlay shaft. I have fixed windlass, repaired bucket and skidway, and commenced a crosscut from the bottom of the shaft to the west, which has been driven 7 feet to intersect the lode formation exposed in the south level of Donoughmore's shaft, and I hope to cut something payable. The ground is hard diorite and quartzite.—James' shaft. The west crosscut has been extended to a total distance of 112 feet from the bottom of the shaft. We have passed through some hard diorite; the ground is now brown slate, with ironstone bands running through it. There is every appearance of coming on a change of ground, and we may come across the Boulder formation. Now that the ground is improving we shall be able to make better progress.—West shaft. As I wrote you previously, we have obtained more water than we require at present; in fact, so much that we cannot keep it down with the whip. After a great deal of trouble we managed to hole through with the winze from the 52 feet level to the 112 feet crosscut, a total distance of 59 feet 6 inches. The ground passed through was hard diorite. We had great difficulty in keeping the water down to enable the men to go through.—New shaft, which will hereafter be called Larage's shaft. I have put two men to start this shaft 200 feet west of West shaft at a point where I think it will be possible to sink 300 feet or more before coming on to the diorite, when I think we shall have sufficient water from both shafts to keep 10 or 15 heads of stamps going. The total distance sunk is 15 feet from surface. I have put in bearers and close timbered up with sawn timber 12 feet 6 inches logged up 6 feet, and erected windlasses. This shaft I shall timber up as I go for the main water shaft. The ground passed through has been very hard cement.—Machinery. The pumping, winding machinery, &c., has now been nearly all delivered at the mine.

KURNALPI.—Report received from the mine:—The St. Kilda shaft is about 8½ chs. south-east of corner peg of lease 1215. I was down the shaft since my return. They have just commenced to open out with an apparent flatish footwall underfoot. If there is a hanging wall it must have been passed through unobserved in the shaft. The lode matter in the face of small drive looks just as well as far as appearance goes as to what I saw at Hannan's. The manager tells me he gets prospects of fine gold, but not in every dish. The shaft is situate at the head of a small ran of gold called Burn's Patch. The lodestone looks better than the much-talked of O'Donnell's, and more like what I saw at the Lake View.

LION (Mozambique).—Report of the superintendent engineer, Mr. Niness, for the month of February:—Drive No. 3 advanced during the month 19 feet, total length 259 feet. We are still in soft decomposed granite, containing small leaders of quartz.—Drive east on new strike. Advanced during the month 12 feet, total length 63 feet. There is no change to report here. Total number of workpeople employed, two white and 18 native.

LAKE VIEW SOUTH.—Mine manager's fortnightly report to March 25:—Shaft No. 4. Shaft work discontinued for present, and we are crosscutting east to total of 20 feet from plant. Ground consists of hard sandstone.—100 feet level. Gold shows all along in the stripping.—Surface work. Battery covered in, and work progressing. Circular saw working to supply timber for battery and condenser. Fair progress making with latter.—(Signed) Wm. Oats.

MOUNT LYELL MINING AND RAILWAY.—Engineer in charge of mine reports for week ending April 3: No. 1 tunnel, north drive. Distance driven for week 2 feet, total 16 feet.—No. 3 tunnel, south drive. Distance driven for week 5 feet, total 567 feet.—No. 4 tunnel, south drive. Distance driven for week 4 feet, total 478 feet.—No. 4 tunnel, south drive. No. 3 crosscut. Distance driven for week 2 feet, total 29 feet.—No. 4 tunnel, south drive, No. 2 rise. Rise has been put up 4 feet for week, total 12 feet. High grade ore in this rise, showing an improvement on last week's work.—No. 4 tunnel, south drive, No. 3 rise. Rise has been put up 3 feet for week, total 7 feet. The high grade ore in this rise shows an improvement for the week's work.—No. 4 tunnel, south drive, No. 4 crosscut. Distance driven for week 1 foot, total 13 feet; face in hard pyrites.—Surface work. Compressor site. The various works are making progress, the erection of compressor, building in and expansion of tubes, &c., of boiler being well under way.—Benches. Stripping of overburden in No. 2½ bench has been steadily carried on during the week, the spoil being lowered down the self-acting incline and utilised in forming bank at its lower end. The widening and timbering of No. 2 tunnel to facilitate the removal of overburden in No. 2 bench has been steadily proceeded with during the week.—Progress report for week ending April 3. Hauling line. In operation, mine ore bins in progress.—Smelter building. Bin doors completed, finishing furnace lean-to, brick lining of hot air main in progress, water service pipes, progressing.—Crusher building. Platelaying siding from through tram, finishing off building, fitting up both crusher and balance of machinery.—Blast furnaces. Water connections of water jackets of No. 2 in progress erecting connections of both boiler pipes with hot air main.—Hot blast stoves. Waiting for girders and U pipes from Straban.—Babcock and Wilcox boilers. Completing steam connections with Roots blowers.—Furnace service tank. Water let into same, no leaks.—Converter department. Brickwork of hill fine completed. New 2 feet locomotive assembled and running. Machine shop engine received and being put together. Material for electric light plant received.—Laboratory. Roofing and siding completed; about to begin interior brickwork.—Plux quarries. All operations suspended until commencement of smelting. Weather mostly fine.—Railway superintending engineer's report for week ending April 4: Weather has been fairly fine for the week, enabling excellent progress to be kept up in all departments. The bridgework is advancing rapidly, and only two more bridges remain to complete to the 15 Mile. The earthworks are principally confined to Hall's Creek now, where the heaviest cuttings are.

NAMAQUA COPPER.—Abstract of superintendent's report for March: Tweefontein Mine. About 12 feet remain to be sunk before a level at 137 fathoms from the surface can be driven.—125 fathom level north-east. The present forecast is not of much value. Worth 2 tons of ore per fathom.—115 fathom level east, No. 26 winze. This winze is going down in a large body of ore. Worth 6 tons of ore per fathom.—115 fathom level crosscut south. A stope has been opened up near the top of the No. 33 winze. The lode is evidently large and will produce a large quantity of ore. Worth 7 tons of ore per fathom.—95 fathom level crosscut north. The lode has not been found, so this level is stopped.—Stopes: 105 fathom level west. A good body of ore is found to be extending south-west of the main level. Worth 10 tons of ore per fathom.—105 fathom level west back of level and 105 fathom level east. These stopes are yielding good stuff, and are each worth 8 tons of ore per fathom.—No. 2 shaft: Intermediate level east. This driving is towards the crosscut from this shaft, and it shows fairly good ground. Worth 7 tons of ore per fathom.—Intermediate level west. The copper at this point is found in a horizontal bed about 5 feet thick. Worth 6 tons of ore per fathom.—Stopes. Two stopes at this place are being worked, and are each yielding 8 tons of ore per fathom.—No. 4 shaft. 12 fathom level east. A valuable section of ground appears to be opening up at this place, although the full breadth of the ore body has not yet been seen. Worth 6 tons of ore per fathom.—12 fathom level east, No. 5 winze. This winze will communicate with the intermediate level. Worth 6 tons of ore per

fathom.—No. 5 shaft. West driving. At this point the lode is about 2 feet wide and produces some yellow ore, though at present not enough to set much value on.—Wheal Julia. Central shaft. The shaft has been timbered and a horse whim erected. The lode being at south of the shaft, nothing is known of its appearance at this depth.—Shipping. The *Matheson Castle* arrived at Port Nolloth on May 5, and left Port Nolloth for Swanssea on May 13 with about 2225 tons of ore.—Output for April. 600 tons of ore of 26 per cent.

SUNBEAM AND VIGILANT.—Mine report for fortnight ending March 28:—Sunbeam. This shaft is now sunk 42 feet, and has passed through several leaders. Dipping north the sinking is pretty good, and very fair progress is being made, and when we reach the 60 feet level shall crosscut towards the reef, and until this is out there will not likely be much to report.—Sunbeam east. We have now crosscut from the shaft at the 65 feet level towards the reef a distance of 32 feet 6 inches, making the drive 6 feet 6 inches by 3 feet, and have passed through several ironstone leaders, and now we have a promising-looking formation in the face of the crosscut.—Sunbeam north. This shaft is now sunk 27 feet, and for the last 5 feet have been sinking on a small lode formation 15 inches wide, which has a quartz ironstone leader on either side. It is now leaving the shaft on the west. I purpose sinking this shaft to the 60 feet level, and crosscutting east to out the reef, and then west to cut the formation we have now passed through, unless it comes into the shaft again.—Sunbeam Extended. This shaft is now sunk 47 feet 2 inches below the brace, and has passed through country rock only, but an ironstone leader is coming in the south-east corner of the shaft. I purpose sinking this shaft to 80 feet, and crosscutting both ways.—Vigilant. The shaft on this lease is sunk 32 feet 6 inches, but owing to the broken and loose nature of the rock passed through it has been necessary to put in 25 feet of set timbering; the last few feet sunk through is better holding ground, and will probably continue so till we reach the 60 feet level, when we shall crosscut to intersect the junction of the two.—Vigilant North. This shaft is now sunk 32 feet from the brace, and has a slate formation varying from 12 inches to 25 inches in width, crossing the shaft with an easterly underlay and strike of north 50 west. This is very fair holding ground, I intend sinking to 60 feet level crosscutting and opening on the reef; then if the work is not followed with favourable results we shall resume sinking to the 100 feet level. The formation in this shaft is very similar to that in the Lake View South Mine, and the gold-bearing stone found there, or, at least, the best of it, was at the lower levels, and this belt of country compares so favourably with the Hannan's auriferous belt that I think we may to a certain extent be justified in expecting to find gold in similar formations and under similar conditions.—Vigilant Extended. The shaft being sunk on this lease is mainly to get a supply of water for all mining purposes, most mines in the district have their own condenser, and supply the miners from it, but here we are under the big expense of paying 7d. per gallon, until at present it has dropped 1d. per gallon. The water shaft, which measures 7 feet by 3½ feet inside the timber is now sunk 23 feet below the surface, or 30 feet below the brace, and I fully expect to find water at 100 feet or under, and a supply at 200 feet.—H. Ley Hancock.—Report of progress during the week ending April 4. Strictly speaking the progress shown in the tabular statement below should be for eight days, as Mr. Hancock's measurements were taken on the 26th ult., Thursday, whilst mine were made on Saturday, the 4th ult.—Sunbeam lease. Our vertical trial shaft is now sunk 70 feet, and we have crosscut in a westerly direction 5 feet towards a supposed lode formation. During the week we have been working in kaolin or decomposed felspar, with leaders of ironstone, having an easterly and westerly strike and dipping northwards. Until we reach the lode formation we cannot expect to meet with any important ore body. We shall now proceed as rapidly as possible with the crosscut which is in good driving, and holding ground so far.—Sunbeam north. The trial shaft in this lease is down to 49 feet from the brace in hard white kaolin with strong ironstone leaders more or less parallel to those in the Sunbeam. Here we propose to crosscut east at the 80 feet level, which we should reach in a few days unless the ground becomes much stronger.—Sunbeam east. The crosscut from the bottom of the shaft at the 65 feet level has been driven in a westerly direction 64 feet, the face is now under the heavy reef formation referred to by Mr. Hancock in his report of March 14. For the last 20 feet a nice quartz and ironstone leader has come into the crosscut, increasing in width as we go forward. In the 20 feet it has increased in width from an indication to 3 inches wide. Its strike is in the same direction as the crosscut and the underlie about 30° north; this is a very encouraging indication. So far we have not met with the lode formation which Mr. Hancock refers to in his report of the 14th ult., as leaving the shaft at the 35 feet level and which he expected to meet with in the crosscut. Our present object is to push on as rapidly as possible with this crosscut, which is in good holding ground.—Progress report for week ending April 4: Sunbeam extended. We have sunk the trial shaft on this lease to a depth of 84 feet through felsparitic rock, and having passed through a heavy ironstone stringer are about to commence a crosscut immediately in a south-westerly direction towards the heavy iron outcrop, which is supposed to cap the lode formation, we hope to be under this in a little more than a week. I propose to drive the crosscut through to the boundary, a distance of 45 feet.—Vigilant lease. On this lease we are down with the trial shaft 60 feet. I think it would be well to sink a little further before crosscutting. The ground continues rather tight on account of ironstone and quartz leaders coming in, but it promises now to hold well, and as the supposed lode formation is quite near a little more depth would be a considerable advantage.—Vigilant north. This shaft is now sunk 66 feet, and we have commenced to crosscut in an easterly direction to cut a supposed formation the dipping of which is 40 feet distant. I have noted Mr. Hancock's remarks in his report of the 28th ult., with regard to the resemblance of the formation in this shaft to that in the Lake View South Mine, and will look into the matter carefully.—Vigilant extended. The rains of March 27 to 29, amounting to about 4 inches, did considerable damage to the upper part and swept away the windlass, also filling the shaft with water, 10 feet of which is still there. As more rain is probable, I have thought it better to commence a new shaft on somewhat higher ground on this lease. This shaft is now well started, being 4 feet down. We are daily expecting a tank on the ground to conserve the water in the old shaft. If we get the 500 gallons which our tank is to contain we shall save £22 10s. worth of water.

SUNBURST.—The manager writes under date April 4, as follows: The following work has been done in your mine during the past fortnight:—Old Shaft. This party have crushed 8 tons 5 dwts. for a yield of 11 ounces 18 dwts. 18 grains smelted gold, the result of five men in five weeks. The reef will average about 4 inches with them at present.—Crosscut, No. 2 level Sunburst. The contractors have driven the crosscut a further distance of 7 feet, total distance driven is now 82 feet. The ground is not so hard to bore and shoots fairly well, so the contractors will be able to make more headway with it now. The water in the mine is just about the same as in last report, pumping 10 hours per day.

TIGER (Massi-Kesse).—Report of the superintendent engineer, Mr. Niness, for the month of February: Drive No. 1 advanced during the month 20 feet, total length 403 feet. We have three leaders of quartz in the end, two of which bear gold. The drive is still in sandstone, and we have cut more water. The latter I consider a good sign that we are approaching a body of ore. Drive to dyke has advanced 15 feet, total length 56 feet. The end is composed of brownish schist, which no doubt overlaps the greenstone, and may constitute one of the walls of the reef.—Total number of workpeople employed. Two white and 16 native.

JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY (LIMITED).—Dividend warrants for dividend No. 4 (interim) of 3s. per share less tax were posted on the 18th inst.

AUSTRALASIAN.—Fortnightly report of Mr. John James, manager, dated April 9: During the past fortnight the shaft has been sunk 10 feet, total 790 feet. The country in sinking this 10 feet was in good black rock with plumbago floors.—768 feet level. We have driven the crosscut west 11 feet, total 17 feet; and also 14 feet east by 8 feet wide and 6 feet high for a lodge to hold the water that is following us down the sinking. I shall start tomorrow to put in the opening out frame, and the concrete dam to keep back the water. I expect to have one of the chambers of the shaft skidded and the cage in it by the 15th instant, when the sinking will again be resumed and the crosscutting to the west carried on, when I hope to meet with good results when we intersect the reef passed through in the sinking of the shaft.

BRITISH BROKEN HILL.—Mining manager's report for week ending April 8: Blackwood shaft. Both stopes in the eastern vein have yielded a fair supply of good grade ore, and the faces all round are looking well. The 100 feet level yielded 433 tons ore, averaging 52 per cent. lead, and 7 ounces silver per ton, and from the stopes above the 100 feet level 712 tons, averaging 45 per cent. lead, and 6 ounces silver per ton.—Howell shaft, 200 feet level. We broke 65 tons lead carbonate ore, averaging 45 per cent. lead, and 2 ounces silver per ton. When the jig plant is ready for work we will be able to put on a large number of men to break ore in this stope, from which the bulk of the carbonate ore will be obtained.—Surface jig plant. Good headway is being made with the erection of this plant. The pipe-fitters are laying the steel riveted water pipes through the plant very rapidly.—Electric light plant. The flooring is now being laid, and as soon as it is finished, the dynamo, switchboard, and connections will be fixed.—Change and dynamo. The large slime tanks to be utilized for this purpose are cleaned out, and a start will now be made to fix the roof, doors, windows, &c.—Week's assays. Carbonates; lead from 30 to 54 per cent.; silver from 1.3 to 9.1 ounces per ton.

BANNER.—Writing on May 1, the company's consulting engineer, Mr. J. B. Low, says:—Having returned from the Banner property to-day, I am able to state that I found the shaft had been sunk to the vertical depth of 1015 feet, all timbered in a workmanlike manner not excelled in any mine in the country. We are now preparing to open a working station, from which we will run a crosscut both east and west. We also note the general mineralisation of the rocks, and our assays show us the presence of gold in all material through which we are passing. I shall examine again as early as an opportunity offers. I called on from the mine as to the depth of shaft and my general idea of the outlook. The cable from Mr. J. B. Low was as follows:—"Shaft has reached the depth of 1015 feet. Prospects are excellent." Mr. G. H. Evans, the company's general manager, cabled on May 7, as follows:—"Shaft has reached a depth of 1030 feet (the desired depth). Now cutting station (preparing to crosscutting to the lodes)."

BAYLEY'S REWARD CLAIM.—Mining manager's report, dated Coolgardie, March 30: Report of work done for one week, a week's exemption having been granted ending March 28.—Everard shaft. The south drive at the 100 feet level has been advanced a further distance of 7 feet, total length 88 feet. Reef is about 14 inches wide, but no gold is visible.—Air shaft. The south drive from the bottom of this shaft is now in 33 feet, having been driven a distance of 15 feet. The face is in clear country.—Tom V. Browne.

BAYLEY'S REWARD NO. 1 SOUTH.—Mining manager's report, dated Coolgardie, March 30:—The following is a report of work done for the fortnight ending 28th inst.:—170 feet level. Stopping has been conducted as usual both north and south of the rise. The stope is payable, and averages in width from 2 to 4 feet. The stopes at back of intermediate level continue to yield good stone.—190 feet level. Winze from bottom of this level has been sunk 4 feet, total 13 feet. The winze is located 38 feet north of rise. Reef about 3½ feet wide. South drive has been driven 3 feet, total 58 feet from shaft. Lode 3 feet wide.—30 feet level. The drive going south of whip shaft now measures 35 feet, the same having been advanced 17 feet for fortnight. Are now engaged driving a crosscut east. Crosscut in 4 feet.—Prospecting shaft. Has been sunk 12 feet, total depth 74 feet.—Stone treated. During the two weeks just ended 78 tons of stone have been crushed.—Tom V. Browne.

CLYDE.—The following is an extract from a report recently received from the manager, at Coolgardie:—I beg to report as follows for the week: Crosscutting for the reef is being continued at the bottom of the main shaft at 200 feet. Owing to the holidays very little work has been done. The quantity of water is now very much larger than during the dry season, partly owing to the increased depth, and partly to the rainfall which occurred last week. I am pleased to report having secured lease 1649 (the Queensland) for the company. This will increase the value of the property very much, as this is a first-class mill site, being high ground, and several valuable reefs of from 3 up to 18 inches across the property. From these reefs very rich stone has been got, and no doubt, with development, stone equally as rich will be found. The mechanical engineer is now in Fremantle, looking after machinery, which I hope to have on the ground in a very short time. The railway block has not yet been got over, but traffic should resume its normal condition during the next fortnight. I gave instructions to our agent in Perth to have the machinery as it was discharged from the ship, so that I am hoping we shall be more fortunate than many of our neighbours, who seem to have lost all trace of many parts, causing no end of delay, expense, and annoyance. I am pleased to say the weather is beautifully cool, and there is an abundance of water all over the fields—that is, for domestic purposes—so that men and horses can now get about without any very serious trouble. The Government of the Colonies has now awakened to the value of these fields, and determined on a policy for supplying them with water. This will necessitate an expenditure of about £4,000,000 of money, and from the results already obtained, and after careful inspection, they (the Government) are convinced that the expenditure of this sum of money will be a profitable investment and a most urgent necessity.

CHAPMAN.—Mining report for fortnight ending April 15: Providencia crosscut east No. 1 driven 6 feet, total 326 feet. Upper portion of face in wolla-tonite, lower portion in quartz some clayrock. We seem to pass through the lower limits of the wolla-tonite in this drift. San Juan winze sunk 6 feet, total 21 feet. In fair ore, assaying gold 5 dwts., silver 7 ounces 15 dwts., copper 29 per cent. Francisco adit drift north-west driven 10 feet, total 40 feet. Has been poorer than usual, but improving again. Sylvia crosscut No. 2 driven 3 feet, total 108 feet 6 inches. No change. Francisco rise risen 11 feet, total 18 feet. In fairly good ore. Assay, gold 3 dwts., silver 5 ounces 15 dwts., copper 28 per cent. Taylor deep adit driven 10 feet, total 85 feet. In harder rock. Shaft use rock drill, when roof is sufficiently strongly. Pine Creek No. 1 driven 2 feet, total 27 feet. Have struck a strong stream of water, suspended for the present. San Juan Extension rise risen 10 feet, total 58 feet. Assays and looks poorer. Assay, gold 2 dwts., silver 6 ounces 10 dwts., copper 3 per cent.—Extraction. Old Providencia. Extracted 64 tons, good ore. Assay, gold 17 dwts., silver 10 ounces 3 dwts., copper 54 per cent.—Santa Fé stopes. Sent 3 tons to mill.—San Juan stopes and drifts extracted 70 tons. Poorer than usual.—Assay. San Juan stopes, gold 1 dwt., silver 1 ounce 17 dwts., copper 36 per cent.—Francisco adit and drifts. Extracted 91 tons. Good milling ore.—Santa Fé mill. Sent 14 tons to mill. Very good ore.

CRESCENT.—Fortnightly report of Mr. T. G. Davey, superintendent, dated April 10: Crescent Mine. Drive north of tunnel B towards main shoot extended 21 feet, total 37 feet. Lode 6 feet wide and well defined, but non-aeriferous up to the present.—Victory Mine. Drive south of tunnel E on Neill's lode extended 27 feet, total 166 feet. Lode, consisting of a number of small veins of quartz, is somewhat aeriferous, but not payable. We have commenced to stope at the back of the north drive, where the lode is 3 feet wide, and valued at 3 ounces of gold per ton. Extension of tunnel E towards western lode advanced 28 feet, total 267 feet. Ground continues favourable for driving. Drive south winze 34 feet below tunnel G extended 17 feet. Lode 6 inches wide, and valued at ½ ounce of gold per ton.—Chance Mine.

Tunnel towards Howard's eastern lode advanced 17 feet, total 37 feet. Have passed through lode, which is 4 feet wide, and somewhat aeriferous, and are about to drive south on its course.—Orlando Mine. Tunnel P towards eastern lode extended 22 feet, total 262 feet. We have passed through the lode, which is well defined but non-aeriferous at the point of intersection, and are about to drive north on its course towards main shoot.—Mill. All is now ready to commence crushing operations, and to-day I turned the water into the race and on to the Pelton wheel, and am pleased to state that the whole of the machinery worked smoothly and most satisfactorily. Unfortunately, however, as a result of the late prolonged drought, there is scarcely enough water to supply our requirements, so that we are unable to crush just at present. The dry season has broken up, and it is now raining heavily, so that I hope to start crushing in a few days. As a precaution, however, I am shifting the Harriettville's Company's 12 horse-power portable engine to the crosscut to act as an auxiliary to the Pelton wheel when water is scarce.

ETHEL-HOPE.—The following is the fortnightly report ending April 11 from Messrs. Bowes, Scott, and Co., Coolgardie, the mine managers:—No. 1 shaft (Ethel) crosscut. The drive to the south-east from this crosscut has been extended 7 feet, total distance driven 13 feet. At this point the reef has cut out, but has gone downwards in the bottom of the drive. The north-west drive has been driven 16 feet, making a total of 30 feet. The reef is opening out much wider in the bottom of the drive, and the samples taken show fine gold. The length of this drive is 30 feet from the crosscut, and from its appearance we think the reef will considerably improve both in size and richness at a deeper point. No. 2 shaft (Ethel) has been sunk a further distance of 12 feet, making a total of 52 feet from the brace. We have no exemption from work in this shaft (Leave 1618), and work has been stopped for the purpose of preparing for the erection of the machinery, which work is being vigorously pushed. The ground has been taken out for the foundation of engine boiler and the poppet heads are being erected. During the past week a store room has been put up 14 feet by 12 feet in size.

FRONTINO AND BOLIVIA.—Reports on the mines.—La Salada, March 25. I beg to submit the following report on Silencio Mine:—Owing to the exceptionally dry weather of late, the pumping wheel has not been able to keep the mine water out, the result is that the water has risen in the shaft, and partly filled the bottom level; the shaft sinking is thus hindered considerably, and also work in the level which, at the present time, is our richest point. In No. 5 level north, the quartz formation on which we were driving is split up in small stringers; we still hope, however, that the lode will eventually form itself in the drive. In the No. 3 level south, the lode improved towards the end of the month, and this drift now carries a good strong lode, which will enable us to open up good stopping ground. The mine, taken on the whole, is looking better than when last reported on. At Maria Dams the work of changing the timbers in the Californian mill have been hindered, owing to the delay in bringing in the wood from the forest; but, fortunately, it has not necessitated the stoppage of the mill, the timbers being mostly in the bin and house construction. This work will probably be allowed to stand over until after Easter, as we have to fill up the bin to provide for the feast time. Sooner or later, however, one by one the batteries in this mill must be stopped, as the battery posts are in a terribly rotten state, and all this work must be carried out as the opportunity presents, in order to interfere as little as possible with the usual returns from the mill. Owing to the scarcity of water, the No. 3 mill at Maria Dams, which is a small native mill, has been stopped for some little time. The axle of this mill is in such a rotten state that it will have to be stopped later on. The mineral from Silencio Mine having gone down somewhat in value, this mill has barely paid costs lately; we intend, therefore, suspending this mill, and keeping it as a reserve in case of accident to either of the other mills at Maria Dams, or until the mineral improves sufficiently to pay the costs of working. At El Salto the arrastres have also been stopped owing to the scarcity of water, only working on days when the water has slightly increased owing to showers of rain. In fact, the exceptionally dry season is making itself felt all through the property.—William Truran.—La Salada, March 25. I beg to hand you my report on the following mines:—La Salada. In the level driving north of the No. 3 crosscut the lode is not quite so large, being now 20 inches wide, of good pay ore. In the south level the lode is opening out, and improving in value. It is now 2 feet thick, of good milling ore. There is no change in the lode in the rise in back of the north level since last report. In the level driving north of the No. 2 crosscut the lode is divided in two branches, there being about 2 feet of decomposed granite between them; the quartz portion of the lode is 2 feet wide of pay ore. In the level south of No. 2 crosscut the lode is more compact, is improving in quality, being now 2 feet 6 inches wide, of fair milling ore. The lode in No. 2 rise in back of this level is 5 feet wide of good ore. In the crosscut driving east of the level south of No. 1 crosscut we have cut through a branch about 2 feet wide of good quality ore; as there is still water coming from the same direction, and judging from the nature of the ground that we are now driving through, I am of opinion that the San Joaquin lode must be very near, and therefore it is necessary to continue the crosscut to prove this. The lode in the rise in back of adit level is 5 feet of fair milling ore. There are three stopes being worked in back of No. 2 level; the average width of the lode is 4 feet wide of good milling ore.—Cordoba. In this mine all the exploration work is suspended until we get some rains, with the exception of two crosscuts in No. 8 tunnel, which are being driven east. The ground at present is very hard and progress rather slow.—Pigrito. There is no change to notice in the lode in No. 6 level driving west. In the crosscut driving south in No. 6 level east we have intersected the lode, which is about 18 inches wide, and of low grade ore. The lode in the stopes in back of No. 6 level west is 3 feet wide, of pay quality ore. No. 3 rise in back of this level west is holed to the No. 5 level above. This has given us good ventilation; it will not be necessary to continue the clearing of the No. 5 level for a few months.—Marmajon and Marmajito. Owing to the long dry season we are very short of water for the mills at these mines, and have had to suspend operations at several points, in order to avoid having any very large stock of mineral at surface. There is no change in any of the exploration levels since last report, and the mineral from the stopes continues to give very good returns.—Surface operations. At La Salada the new hoist engine is finished, with the exception of the two ends of the cylinder, and the top of one of the valve boxes, which are not to hand. The boiler is in its place and connected, and the carpenters will have the house completed in a few days. We have commenced preparing the timbers for the new skiproad, and the new skips are in hand. At Cordoba the new tramroad from No. 8 to the mouth of Tigrito Mine is nearly completed, and the new kitchen at Marmajito is practically completed, there remaining only a few small things to finish. Throughout the mines we have had less water during the past 14 days. At La Salada new mill only 10 stamps have been working, on the other mines the same number of stamps as last reported have been working very slow. The quantity of water now coming to the La Salada Mine is not sufficient for the pumping wheel to keep the mine drained of water. We have, however, a good supply of mineral from the Nos. 1 and 2 levels for the mill.—Alfred F. Secombe.—La Salada, April 10: I beg to submit the following report on Silencio Mine:—Owing to the continued scarcity of water the bottom level has been unworkable for some time, and the bottom bucket has been disconnected in order to help the pumping wheel in keeping the water from rising higher. Inasmuch as our richest ground is in the bottom level and stopes the mineral going to the mill has not been up to the usual average. How long this will continue depends entirely on the coming of rain. There is no important change to mention in the other parts of the mine. During the feast of Easter we managed to keep the Californian mill running without any stop, having prepared sometime previously, by depositing mineral outside the bin. The native mill has been working all the time, but latterly with a reduced number of heads, owing to the lack of water. In the Salto the arrastres are also stopped, there

being no water to work even one. We have three or four men washing there on deposited sulphurets that have already been washed, and from which we manage to extract a little. As yet we have not been able to proceed with the work of changing the timbers of the Californian mill, but the carpenters are now at work preparing the wood.—William Truran.—La Salada, April 10. Gentlemen,—I beg to hand you my report on the following mines:—La Salada: Nothing has been done in No. 3 level since last report, on account of the scarcity of water, there not being enough coming from the Pocaré and Tias watercourses to keep the mine drained. During the past fortnight the Easter holidays have intervened, somewhat interrupting our operations in the mines; in fact, several points have only been worked a few days, and, therefore, there are but very few changes to report on. In the level driving north of the No. 2 crosscut, the granite that is in the middle of the lode is not quite so thick, and the hanging-wall branch has widened out to 10½ inches of good ore. In this level south the lode is without change. The lode in No. 2 rise in back of the south level is not quite so good. There are no changes in any of the other workings to call for any remarks; they continue to give good milling ore.—Cordoba. The ground in the crosscut driving east of the level, north of No. 8 crosscut, has become softer, and better progress will be made. Up to the present, however, nothing of importance has been met with either in this or the crosscut in the south level. At the Tigrito and Marmajito Mines there is nothing new to report.—Alfred F. Secombe.

GREAT BOULDER PERSEVERANCE.—Extracts from mine manager's report for fortnight ending April 9: No. 3 main shaft has been sunk 13 feet 6 inches, making a total of 86 feet from brace, and the ground is a little better for sinking. Part of the winding plant is now on the property, and tenders will be called for delivery of poppet heads. No. 4 shaft is now down 81 feet, having been sunk 15 feet during fortnight. At 73 feet we passed through the diorite and struck the Lake View lode, giving by diaph assay 1½ to 2½ ounces per ton. This shaft is about 400 feet from the Lake View boundary, and is a very important find. Have sunk through 8 feet of the lode, and no sign of the footwall yet. Intend to sink until footwall is met, and then sink on underlay to water level.—No. 7 shaft. Crosscut has been extended 12 feet 6 inches, making 23 feet 6 inches from shaft. No change as yet. Will extend this crosscut a further distance of 26 feet. Should nothing of importance be met then, it is my intention to crosscut east, as the lode may be east of the shaft.—(Signed) J. Kearnan.

GREAT BOULDER SOUTH.—Extracts from mine manager's report for fortnight ending April 9: No. 1 shaft. Crosscut west has been extended a further 42 feet, making 80 feet from shaft. Still passing through ironstone veins, but no other change.—No. 2 shaft. Crosscut east has been driven a further 39 feet, making 59 feet from shaft. No change since last report.—No. 3 shaft. Crosscut has been extended further 52 feet, making 73 feet from shaft. Have passed through various ironstone leaders. Whips have been erected at the above three shafts.—(Signed) James Kearnan.

GOLDEN HORSESHOE.—Resident engineer's report for fortnight ending April 9:—No. 1 shaft, west crosscut, 3 feet have been driven during fortnight, making a total length of 45 feet. This crosscut has for the present been discontinued, and the miners are engaged in driving crosscuts through the lode at the 80 feet level to test its width. In one of these crosscuts, midway between Nos. 1 and 2 shafts, the footwall of the lode was reached in 6 feet. Samples taken daily showed fine gold, but not encouraging.—No. 2 shaft east crosscut. 5 feet have been driven during the fortnight, making a total length driven of 15 feet 6 inches. This is still in lode stuff, but the samples taken show very poor results.—No. 3 shaft, winze. 20 feet have been sunk during fortnight, making a total depth sunk of 37 feet. The average size of reef is 6 feet. Samples taken show good prospects, and give an average assay of 1 ounce 7 dwts., 10 grains per ton of ore. We think it may now be taken for granted that from the size of the lode we must be working on a continuation of that in the Ivanhoe.

GOLDEN DOVE.—The following are extracts from a report by Mr. A. E. Edwards:—I have now so far as the personal matters about which I had to enquire are concerned finished my work. We started the battery engine on the 17th, and I must say that although Garrett is slow with his work, he is a most careful man. We got 60lb. pressure in a very short time, the wood for burning being splendid, and started. There was not a single bad joint, and she ran beautifully smooth. It was most interesting to me to see the blank astonishment of the natives. I think they thought I was the one who had put life into the big animal. By June 25 the mine will be in full swing, there being very little now to do to complete the erection of machinery, and I have not the slightest doubt that the result will be most satisfactory, and that profits will immediately begin.

HARRIETVILLE.—Fortnightly report of Mr. T. G. Davey, superintendent, dated April 10: Tiddlee Mine, Bibby's new lode. Rise at back of drive north of tunnel F advanced 17 feet, total 34 feet. Lode has become small and poor. There is now every evidence that this is a branch from Bibby's main lode, and we have commenced to crosscut east towards the latter, which should be reached during the coming fortnight. The crosscut is already advanced 13 feet. Extension of tunnel E towards Bibby's lode advanced 19 feet, total 40 feet. We have reached the lode, and are now driving north on its course. The small vein at tunnel D, referred to in last report, was of limited extent, and has already been stopped out.

HAMPTON PLAINS EXPLORATION.—The following is the weekly report of work done on Block 59, dated 1 April 11:—Shaft on new find sunk 8 feet, making a total depth of 24 feet. The average width of solid quartz is 15 inches. The stone is of good quality, showing rough gold in nearly every piece broken. There are also several quartz and mullocky leaders running parallel with the reef carrying gold. Since Friday two shifts of men (four) have been employed on this shaft. During the week I have re-pepped the lodes.

MYSSORE GOLD.—R. Hancock, April 29: Mining operations for the fortnight ending April 27: Rows's shaft. 1460 feet level north of crosscut west. There are three stopes in the back of this level, the average width of the lode being 2 feet 6 inches, giving an average assay of 17 dwts., 16 grains.—1460 feet level north of sump winze. The lode in the stope in the back of this level is 5 feet wide, assaying 15 dwts.—1360 feet level south of crosscut. This level has been driven 13 feet 6 inches, making a total distance driven of 306 feet 3 inches. The lode is 1 foot 6 inches wide, assaying 1 ounce. There are five stopes in the back of this level, the average width of the lode being 1 foot 9 inches, giving an average assay of 1 ounce 0 dwt., 22 grains.—1360 feet level north of crosscut. The lode in the stope in the back of this level is 1 foot 6 inches wide, assaying 13 dwts., 1 grain.—1360 feet level north of sump winze north-east. This level has been driven 16 feet, making a total distance driven of 453 feet. The rise in the back of this level has been put up 5 feet, making a total height of 108 feet 6 inches, and holed to the 1260 feet level north. The crosscut east in this level has been driven 14 feet, making a total distance driven of 43 feet 6 inches. There are two stopes in the back of this level, the average width of the lode being 3 feet 3 inches, giving an average assay of 15 dwts.—1360 feet level south of sump winze. There are two stopes in the back of this level, the average width of the lode being 3 feet 6 inches, giving an average assay of 14 dwts.—1260 feet level north. There are five stopes in this level, the average width of the lode being 2 feet 6 inches, giving an average assay of 17 dwts.—1260 feet level north of crosscut. This end has been driven 23 feet, making a total distance driven of 163 feet 6 inches. The lode is 4 feet wide, assaying 1 ounce 15 dwts.—1260 feet level south of crosscut. This end has been driven 8 feet 6 inches, making a total distance driven of 174 feet 6 inches. At this point we struck the dyke, and the driving has been suspended. We have started to rise in the back at the end of this level. Risen 10 feet 6 inches. The lode is 4 feet wide, assaying 1 ounce.—1260 feet level south. This level has been driven 15 feet 6 inches, making a total distance driven of 513 feet 6 inches. There is nothing here to report. There are five stopes in the back of this level, the average width of the lode being 1 foot 8 inches, giving an average assay of 1 ounce 2 dwts., 5 grains.—1160 feet level north. The lode in the

stope in the bottom of this level is 2 feet wide, assaying 3 ounces.—1160 feet level north of crosscut. This end has been driven 12 feet, making a total distance driven of 184 feet. The lode is 4 feet wide, assaying 1 ounce 12 dwts. 16 grains. The rise in the back of this level has been put up 18 feet, making a total height of 42 feet. The lode is 4 feet wide, assaying 19 dwts. 14 grains.—1160 feet level south. There are five stopes in the back of this level, the average width of the lode being 1 foot 11 inches, giving an average assay of 18 dwts.—North of the crosscut east. The lode in the stope in the back of this level is 2 feet wide, assaying 1 ounce 10 dwts.—1060 feet level north, crosscut east. This has been driven 9 feet, making a total distance driven of 39 feet.—620 feet level south. There are two stopes in the back of this level, the average width of the lode being 2 feet, giving an average assay of 17 dwts. 12 grains.—Crocker's shaft. This shaft has been sunk 12 feet 6 inches, making a total depth of 58 feet 6 inches below the 1060.—1060 feet level south. The rise in the back of this level has been put up 15 feet, making a total height of 79 feet. The lode is 4 feet wide, assaying 3 ounces.—Driving north of the crosscut east from the 890 feet level north. This end has been driven 18 feet 6 inches, making a total distance driven of 37 feet. There is nothing here to report.—890 feet level north. The lode in the stope in the back of this level is 3 feet wide, assaying 1 ounce.—890 feet level south. There are five stopes in the back of this level, average width of the lode being 4 feet 5 inches, giving an assay of 1 ounce 2 dwts.—780 feet level south. The rise in the back of this level has been put up 9 feet 6 inches, making a total height from the back of the stope of 13 feet 6 inches. The lode is 2 feet 6 inches wide, assaying 1 ounce 3 dwts. There are nine stopes in the back of this level, the average width of the lode being 2 feet 6 inches, giving an average assay of 16 dwts. 20 grains.—620 feet level south. The lode in the stope in the back of this level is 1 foot 6 inches wide, assaying 15 dwts.—236 feet level north. The lode in the stope in the back of this level is 1 foot 6 inches wide, assaying 1 ounce.—Taylor's shaft, 466 feet level north. The lode in the stope in the back of this level is 1 foot 6 inches wide, assaying 10 dwts.—Gilbert's shaft. This shaft has been sunk 14 feet, making a total depth of 220 feet 6 inches below the 650.—650 feet level north. The rise in the back of this level has been put up 8 feet 6 inches, making a total height of 67 feet. The lode is 2 feet wide, assaying 8 dwts. 4 grains.—650 feet level south. This level has been driven 25 feet 6 inches, making a total distance driven of 60 feet. The lode is 2 feet wide, assaying 15 dwts. per ton.—520 feet level north. The lode in the stope in the back of this level is 1 foot 6 inches wide, assaying 13 dwts. 1 grain.—520 feet level south. The winze in the bottom of this level has been sunk 2 feet 6 inches, making a total depth of 58 feet 6 inches. The lode is 2 feet wide, assaying 1 ounce. The lode in the stope in the back of this level is 1 foot wide, assaying 18 dwts. 4 grains.—380 feet level north. The lode in the stope in the bottom of this level is 2 feet wide, assaying 15 dwts.—290 feet level north. There are three stopes in this level, the average width of the lode being 2 feet, giving an average assay of 14 dwts. 8 grains.—180 feet level south. There are two stopes in the bottom of this level, the average width of the lode being 2 feet 6 inches, giving an average assay of 11 dwts. 12 grains.—Tennant's shaft, 750 feet level north of the crosscut west. This end has been driven 18 feet 6 inches, making a total distance driven of 396 feet 6 inches. The lode is 2 feet wide, assaying 15 dwts. The winze in the bottom of this level has been sunk 12 feet 6 inches, making a total depth of 30 feet. The lode is 2 feet 6 inches wide, assaying 16 dwts. 3 grains.—520 feet level north. The lode in the stope in the back of this level is 2 feet 6 inches wide, assaying 10 dwts.—360 feet level north, south of crosscut. There are two stopes in this level, the average width of the lode being 2 feet, giving an average assay of 11 dwts. 12 grains.—Schaw's shaft, 450 feet level north of the crosscut. There are two stopes in the back of this level, the average width of the lode being 1 foot, giving an average assay of 19 dwts.—450 feet level south of crosscut. The lode in the stope in the back of this level is 2 feet 6 inches wide, assaying 10 dwts.—320 feet level north. There are two stopes in the back of this level, the average width of the lode being 2 feet 9 inches, giving an average assay of 6 dwts. 12 grains.—McTaggart's shaft. This shaft has been sunk 7 feet 6 inches, making a total depth of 77 feet 8 inches below the 650. The shaft has passed through 5 feet of dyke rock, and there is now a little quartz coming in the south end of the shaft, which assays 15 dwts.—650 feet level north of the crosscut west. This level has been driven 2 feet 6 inches, making a total distance driven of 16 feet. The lode is 1 foot 6 inches wide, assaying 1 ounce.—650 feet level south of the crosscut west. This level has been driven 11 feet 6 inches, making a total distance driven of 401 feet 3 inches. The No. 1 winze in the bottom of this level has been sunk 3 feet, making a total depth of 73 feet. The lode is 4 inches wide, assaying 16 dwts. 3 grains. The No. 2 winze in the bottom of this level has been sunk 3 feet, making a total depth of 52 feet 3 inches. The lode is 6 inches wide, assaying 18 dwts. 4 grains.—320 feet level south. There are two stopes in the back of this level, the average width of the lode being 2 feet, giving an average assay of 11 dwts. 12 grains.—Prospect shaft No. 2, 117 feet level south. This level has been driven 4 feet, making a total distance driven of 57 feet 6 inches.—Riddell's shaft. This shaft has been sunk 9 feet, making a total depth of 82 feet 6 inches below the 1520.—1520 feet level north. This level has been driven 10 feet, making a total distance driven of 176 feet. The lode is 4 inches wide, assaying 4 dwts. 13 grains.—Crosscut west from the 1060. This has been driven 15 feet, making a total distance driven of 178 feet.—Williams' shaft. Crosscut east from the 173. Driving north 17 feet from the end of the crosscut driven 7 feet, making a total distance driven of 19 feet. There are a few small stringers, which assay 7 dwts. 19 grains.—Health. Good. Weather very hot.

MAORI.—Extract from a letter, dated April 4, from Mr. C. J. McMahon, the managing director in Australia:—Mine. From No. 1 shaft the level has been driven a further distance of 35 feet. I told you in my last report that the reef in the south end of drive was very much broken up and poor as to quality and size, and for some distance we have had no stone, but as I anticipated, after getting through the disturbed country we have picked the reef up again on its true course, and also I am happy to report that the stone is stronger as to size than ever, over 3 feet of stone, this I take to be of great value as going to prove the continuity of lode. The stone is also good payable rock, not so much visible gold as we have had at times, but first rate results upon prospecting, also considerable quantities of mende and galena distributed through the stone with pyrites, all also carrying gold. We are now starting to stope from both shafts, and must have 300 tons of ore at grass. So far I have not worked upon the end of shaft (north), from which the rich stone which was taken to London came, but have been pushing on the development work in new untried ground, and cannot but report that the claim bids fair to be a good one. We are not sufficiently far advanced along course of lode in south end, where, as I before stated, we have now over 3 feet of stone, but should this equal the other stone raised from this end of ground we shall want to add another five head of stamps to our plant.—Plant. I am glad to say that I have made a start with the machinery erection, and provided no hitch occurs with the forwarding, expect to complete same in four weeks. The stamper piles and bed logs are now in position, and we are starting on the upper portion of framework next week. Foundations also for counter shaft (concrete) are nearly complete.

MENZIES GOLD ESTATES.—Extract from mine manager's report dated April 2: Block 3046, Aurelia. On Sunday, March 9, the outcrop of a new vein was discovered, bearing from the north shaft 235° distant, 181 feet 6 inches. This vein proves to be the same vein as the western vein of the Aspasia; its strike is 323°, or nearly north-west by north-north-west; from the spot of the new discovery to the Aspasia shaft the distance is 1800 feet, passing close through the Pandora lease, in which lease we have opened it since the

discovery in two places at each end of the lease. There will be 950 feet of this vein in the Aurelia ground, and since the discovery we have found it on the line again 60 feet to the northward of the first spot. We have started a shaft at the point first mentioned. The present depth is 5 feet. The formation is about 2 feet thick, including a vein of quartz about 10 to 12 inches thick. Upon breaking the stone it shows gold very freely both coarse and fine. The stone appears to be similar to that already raised from the western shaft of the Aspasia, but more solid, and not so laminated. It is difficult to select a sample of this stone for assay, as it shows patches of coarse gold, and a picked sample would certainly go more than 100 ounces to the ton. In the sample we have taken for assay, we have thrown out all stone in which coarse gold was visible. Sample, 3 ounces 3 dwts. 6 grains, with a trace of silver. Granular iron-stained quartz carrying pyrites, and showing fine gold on breaking.

NUNDYDROOG.—Thomas Richards' report for the fortnight ending April 25: Kennedy's shaft has been sunk 5 feet 9 inches, total depth 24 feet 9 inches below the 700 feet level. The 700 feet level north has been driven 12 feet 6 inches, total distance 75 feet 6 inches. Lode 3 feet 6 inches wide (mixed) assays 2 dwts. 12 grains of gold per ton. The 700 south has been driven 9 feet 6 inches, total distance 69 feet 6 inches. The lode having pinched here, a crosscut east was commenced at about 60 feet from the shaft, and the footwall part of the lode met with is 2 feet wide, assaying 2 ounces 10 dwts. The 600 north has been driven 14 feet 6 inches, total distance 459 feet 6 inches. Lode is 1 foot 6 inches wide, and assays 5 dwts. The rise in the back of this level has been put up 24 feet, total height 83 feet. Lode 1 foot wide assays 2 ounces 5 dwts. Nothing having been met with in the 600 south crosscut west, a crosscut east, opposite the former, has been commenced, and extended 8 feet. Some stringers of quartz of no assay value have been passed through. In two stopes in the back of the 520 north the lode averages 4 feet 6 inches in width and 1 ounce 1 dwt. 6 grains in assay value. The lode in the stope in the back of the 440 north is 4 feet wide, and assays 1 ounce 2 dwts. 12 grains. The 440 south has been driven 18 feet 6 inches, total distance 1406 feet 6 inches. The crosscut west from this level has been extended 15 feet, total distance 165 feet. The 370 north crosscut west has been extended 10 feet, total distance 520 feet. No change. In two stopes in the back of the 370 north the lode averages 4 feet 6 inches in width and 13 dwts. 18 grains in assay value. The lode in the stope in the back of the 370 south is 5 feet wide and assays 1 ounce of gold per ton. The 300 north has been driven 10 feet 6 inches, total distance 400 feet 6 inches. Lode 1 foot wide, assays 7 dwts. 12 grains. The 300 intermediate drive north has been driven 3 feet 3 inches, total distance 59 feet 9 inches. A crosscut west was commenced at this point and put out 9 feet 9 inches, but no further portion of the lode has been found. In two stopes in the back of the 300 north the lode averages 3 feet 6 inches in width and 16 dwts. 6 grains in assay value. The 230 north has been driven 2 feet, total distance 380 feet 6 inches. A crosscut west at this point has been put out 1 foot. In the stope in the back of the 230 north the lode is 3 feet wide, and assays 6 dwts. 6 grains. The 230 south has been driven 16 feet, total distance 310 feet. Lode of no assay value. The lode in the stope in the back of the 160 north is 3 feet wide, and assays 2 ounces 10 dwts. The 160 south has been driven 22 feet, total distance 504 feet 3 inches. Lode of no assay value. In the stope in the back of the 95 north the lode is 2 feet wide, and assays 3 dwts. 18 grains. New shaft has been sunk 8 feet, total depth 110 feet below the surface. Main shaft has been sunk 3 feet, total depth 10 feet 6 inches below the 1160 level. The 1160 north has been driven 11 feet 9 inches, total distance 68 feet. Lode of no assay value. The 1080 north winze has been sunk 9 feet, total depth 56 feet 6 inches. Lode is 5 feet wide, assaying 2 ounces 2 dwts. 12 grains. The lode in the stope in the back of the 920 north is 4 feet wide, and assays 12 dwts. 12 grains. In the stope in the back of the 920 south the lode is 7 feet wide, assaying 7 dwts. 12 grains; and in the stope in the back of the 840 south it is 6 feet wide, assaying 4 dwts. 9 grains. The 680 north has been driven 12 feet 6 inches, total distance 599 feet. The lode, consisting of stringers of quartz, is of no assay value. The 520 north has been driven 14 feet, total distance 508 feet. A winze is now being sunk, with the object of effecting a communication with the 440 south from Kennedy's. The 370 north has been driven 9 feet, total distance 199 feet. Lode of no assay value.—Taylor's shaft. The 1240 north has been driven 11 feet 6 inches, total distance 282 feet 6 inches. Lode of no assay value. The 1240 south crosscut east has been extended 4 feet, total distance 42 feet 6 inches. No change. In two stopes in the back of the 1000 north the lode averages 3 feet in width, and 4 dwts. 16 grains in assay value. In the stope in the back of the 920 north the lode is 3 feet wide, and assays 6 dwts. 6 grains. In two stopes in the back of the 840 north the lode averages 2 feet 6 inches in width, and 9 dwts. in assay value. The 840 south rise has been put up 8 feet, total height 45 feet. Lode is 4 inches wide, assaying 3 dwts. 18 grains. In the stope in the back of the 600 north the lode is 3 feet wide, and assays 5 dwts. The lode in the stope in the bottom of the 520 north is 3 feet wide, assaying 15 dwts. In the stope in the back of the 520 north the lode is 2 feet 6 inches wide, and assays 6 dwts. 6 grains; and in the 230 south back stope it is 2 feet 6 inches wide, assaying 8 dwts. 18 grains.—Old Mill sampler. Pulp 1 ounce, tailings 3 dwts. 3 grains.—New mill samples. Pulp 1 ounce 5 dwts., tailings 4 dwts. 12 grains.

QUEEN CROSS REEF.—Manager reports for fortnight ending March 31 as follows:—Underlie shaft has been sunk a further distance of 10 feet, making a total of 82 feet from the drive. There are 3 feet 6 inches of good quality stone in the sink. Sunk the winze a further distance of 12 feet, making a total of 91 feet from the drive. The winze is looking well, and shows about 3 feet 6 inches of good quality stone, which looks likely to continue. The eastern drive has been driven a further distance of 6 feet, making a total of 134 feet from the shaft. There are about 8 inches of good quality stone in the drive, which I think will improve as the formation is better for working. The stope behind the shaft are still looking well, but reef a little smaller; it is about 18 inches in thickness, but of better quality, the last breaking down. The quantity of stone raised for the fortnight is 80 tons, making a total of 344 tons in the paddock.

TAMWORTH.—Extracts from letter dated Tamworth, N.S.W., April 11: I am forwarding photos by this mail which will show you the position, and have now great confidence that we shall give you a first crushing within a fortnight.—Note. The news of this was received by cable on May 7. I am very glad to be able to tell you that the men I put on to work in the top of No. 3 tunnel have struck the rich 20 ounce reef, so that now we have gold in all three tunnels, and there cannot be the shadow of a doubt but that the company possesses one of the richest properties in Australia. I strongly recommend the directors to get compressed air rock drills and a good boiler. They could be purchased out here second hand, but as good as new for a comparatively small sum, and with the air drills we should drive the No. 1 tunnel just six times as fast as we are now able to do, and at one-half the expense. We are now working this tunnel night and day with three eight hour shifts—it is so important to get this tunnel in to the rich reef in the winze so as to drain the water out and be able to stope down this rich reef for crushing. The tunnel cannot now be very far from the reef, and we may cut into it very soon—sooner even than some of them expect.

TRUE BLUE (Hannan's).—Mine manager's report to April 13: No. 1 main shaft. Good progress is being made in cutting the stations at the No. 1 level. The north-east crosscut has been extended a further distance of 30 feet in good class of gold-bearing country, total distance driven from shaft 158 feet. The south-west crosscut has been driven 16 feet, total distance from the shaft driven in this direction 200 feet. The ground continues very hard.—Intermediate level. Fair progress is being made in the stope above this level, as per sketch plan annexed. Shaft A has been sunk a further depth of 5 feet in hard ground, total depth of shaft from the base 77 feet.—Jubilee section, Jubilee shaft. The south-west crosscut has been extended 20 feet for the fortnight, total length of crosscut 90 feet, through well-mineralised but very hard country.—Intermediate level. Stopping above this level has been discontinued, and

all work at this point suspended, the ore being too poor in quality and limited in quantity to warrant any further expenditure under obtaining conditions.—Shaft B. The north-east crosscut has been extended 23 feet, total distance driven from the shaft 45 feet, with no fresh developments to report. The teamsters have commenced to cart the ore to the mill, and I hope to commence crushing on the 22nd inst.

VAN RYN GOLD MINES ESTATE.—General manager reports for March: Mine No. 4. New main shaft sinking 23 feet, old main shaft sinking 20½ feet, fourth level main shaft rise 68½ feet, driving third level 38 feet, driving fourth level 118 feet, driving second level 86 feet, driving first level leader 60½ feet, third level boxholes 25½ feet, total 440 feet.—Mine No. 8. Sinking main shaft 12 feet, driving first level 100½ feet, driving second level 87 feet, second level, second rise east 60 feet, first level, intermediate drive east 9½ feet, total for month 709 feet.—Ore developed. Mine No. 4. First level 1179 tons, second level 2795 tons, third level 1235 tons, fourth level 3835 tons.—Mine No. 8. First level 2145 tons, second level 1696 tons, total 12,885 tons.—Ore in sight. Mine No. 4. First level 27,543 tons, second level 10,148 tons, third level 18,998 tons, fourth level 24,363 tons, total 81,052 tons.—Mine No. 8. First level 19,258 tons, second level, 27,605 tons, total 46,863 tons.—Mine No. 4. New main shaft was sunk 23 feet, making a total depth of 407 feet. At the first level station a box for filling the ore has been cut and fitted up. At the second level station another box has been started. Old main shaft was sunk 20½ feet, total depth 760½ feet, being 200 feet below the fourth level. Fourth level drives were extended 118 feet, total length 1465½ feet. In the west the reef is from 18 inches to 36 inches thick, and the average assay is 1 ounce 12 dwts. In the east the reef is broken, but was picked up beyond the dyke, and assays 13 dwts. 16 grains for 18 inches width. Third level drives were extended east 38 feet, total length 1525 feet. The reef is 4 inches thick, and assays 5 ounces 7 dwts. 12 grains. Second level drives were extended east 86 feet, total length 1556 feet. The reef has thinned out, and we are approaching a dyke. No assay has been made. First level leader drives were advanced 60½ feet. The total length west of No. 4 shaft is 191½ feet. Assays are 1 ounce 1 dwt. for 12 inches thickness.—Mine No. 8. Main shaft No. 8 was sunk 12 feet. Total depth 408½ feet. First level drive east was extended 100½ feet. Total length 1674 feet. Reef assays 12 dwts. 11 grains over 18 inches. Second level drive east was extended 87 feet. Total length 780 feet. Reef is 4 inches wide and assays 1 ounce 13 dwts.—Stamp Mill. March. 50 stamps run, 25 days 10 hours, ore crushed 3820 tons, crushed per stamp per day of 24 hours 3 tons, gold won (plates and concentrates) 1537 ounces, average yield of gold from plates and concentrates, 804 per ton. Many stoppages occurred through the defective state of the old machinery, and the returns will not improve until the new stamps commence working.—Cyanide works. January. Tons treated, 3730, February 3600, March 3990, yield, January, 588 ounces, February 560 ounces, March 551 ounces, cost per ton, January, 9s. 8d., February 5s. 7d., March 4s. 2d., actual extraction, January, 68.56 per cent., February 62.0 per cent., March 61.4, assay value, January, 3 dwts. 12 grains, February 3 dwts. 18 grains, March 3 dwts. 11 grains. The tailings remaining in the old dam are acetous and poor. They are besides mixed with slimes, making the extraction very difficult.—New works. The larger part of the hauling engine for the main shaft has arrived, and is being erected. One more boiler for the mill steaming plant has arrived and has been erected. Three boilers are now being bricked in. The economiser for the boiler plant has also arrived, and is in course of erection. Boiler feed pumps and economiser engine are in place and battery tables are finished.—Native labour. More boys have arrived during the month, and there are plenty of natives available for the present work.—Profit for month (plates and concentrates), £268 13s. 2d., estimated profit (cyanide works), £977 10s. 8d., total profit for month, £1246 3s. 10d.

VICTORIA AND QUEEN.—Copy of manager's report for fortnight ending March 31: Driven the No. 4 drive a further distance of 9 feet, making total 57 feet from draft mark. The reef is about the same as last report. The winze at the end of No. 3 crosscut has been sunk a further distance of 15 feet, making total 49 feet. The reef is about 6 inches of fair quality stone. Driven No. 3 drive a further distance of 9 feet 6 inches, making a total 135 feet 6 inches. The reef averages about 10 inches of fair quality stone. Underhand stope No. 3 drive averages 15 inches of good quality stone. The back stopes No. 3 drive average about 1 foot of very heavy mineral stone. No. 2 underhand stopes average about 15 inches of medium quality stone. Hauled during the fortnight 140 tons, making a total of 395 tons in the paddock.

VICTORY (Charters Towers).—Mining manager's report for fortnight ending April 4: No. 2 shaft. The 320 feet level has been driven west a further 11 feet; the present length of this drive from shaft to face is 328 feet. The nature of the country passed through is much the same as last reported, except having met with several felspar leaders in formation. No. 7 level has been driven 7 feet for fortnight, total length of this drive up to date 316 feet. There is no change here to report on. In the rise above No. 1a the reef will average 14 inches. The quality of the stone here is looking better; it is carrying more mineral now than it has done for some time. There has been hauled from this shaft 22 tons for the fortnight, total at surface 74 tons.—No. 3 shaft. The underlay has been sunk a further 24 feet, total depth from straight shaft 223 feet. There is 7 feet of formation in the bottom between two good walls. The reef is broken up into several veins; taking them altogether they will average 9 or 10 inches. There is an improvement here the last few shifts. The stone is looking better, and the veins seem to be coming together. The grade of underlie in bottom is about 80°. I cannot sink much further without cutting away the brow where footwall turned over. It should have been done before, but I want to be certain of the proper course the reef is taking before doing it. The No. 1 east drive has been driven 6 feet, total length up to date 44 feet. We are within a few feet of the boundary with this drive. There is 9 inches of fair-looking reef in the face. There has been 7 tons hauled from this shaft for the fortnight; of this 4 tons went to the mill in the last crushing, leaving 3 tons in the paddock. We got the new engine started to work on the 25th. It is giving satisfaction.

WEST AUSTRALIAN GOLD CONCESSIONS.—Manager at Coolgardie reports as follows: In Hannan's Golden Dyke Mines (Limited), dated April 6. The former workings on this property before I took charge are principally on the 12 acre lease 197, where several shafts have been sunk in a huge dyke formation, the deepest being 50 feet, with a crosscut 28 feet into the formation. This dyke carries nice gold, and there is a pile of ore at grass, which will give good results. It is my intention to apply for concentration of labour, and place all the workmen on this block, and sink the 70 feet shaft to a further depth of 100 feet.—(Signed) T. E. Hardy.

WEST RANDT DEVELOPMENT.—Mr. Andries Van Driel, the local director at Heidelberg, under date April 16, reports as follows:—From outcrop indications I have continued to follow the surface formation. In No. 3 shaft have cut a reef at 12 feet. The lode matter is very friable and can be easily worked by cyanide process. In No. 1 shaft the reef has widened out from 4 feet to 6 feet in the tunnel. Both the Blue reef and the Sandstone reef are of a very soft nature and easy for crushing purposes. Have sent samples of both reefs at the 35 feet level for analysis. It will be necessary to get a pump to keep water under in the No. 1 shaft. Under date of May 16 Mr. Van Driel cables:—“I confirm telegram of the 23rd ultimo. Prospects generally continue to improve. Average value ore about 15 dwts. of gold to the ton. We are sinking shafts to connect with the main shaft. Another reef has been found.”

IMPORTED TIN.—The quantity of tin in blocks, ingots, bars, and slabs imported into this country during April amounted to 26,581 cwt., being a decrease of 5865 cwt., as compared with April, 1895. Of this quantity 24,970 cwt. were imported from the Straits Settlements, as against 84,300 cwt. in the corresponding period of last year.

(Concluded from page 622.)

7 hrs. 35 min. Total make of steel, 99 tons 3 cwt. Yield on the metals charged, 95.33 per cent.

Description.	Weight of Materials Charged.	Used per Ton of Steel.
	Tons. cwt. qrs. lbs.	
Hematite pig iron ..	79 10 3 0 ..	16.04 cwt.
Steel scrap ..	23 12 3 0 ..	4.77 "
Ferro-manganese ..	0 16 2 2 ..	18.7 lbs.
Iron ore ..	16 10 0 0 ..	3.39 cwt.

The measurements as to the quantity of gas used have been given me, but as the furnace was drawing its supply from the works mains, it is difficult to arrive at this accurately. I would prefer to let the question of consumption rest by saying that three charges of steel were made in 24 hours, and that the amount of gas consumed by the furnace was not appreciable at the gas producer.

One of the points of difference I observed between the Mond gas in the steel furnace and ordinary producer gas was the considerable length of the flame. In a shorter furnace than the one referred to sufficient gas could not be kept on without reaching right across from port to port. With the furnace of the size given the gas seemed to thoroughly expend itself, and kept the steel at a satisfactory temperature during the whole operation with apparently a very small consumption of gas. The bath seemed to boil all over equally, and as an indication of the equal temperature in the furnace, I would mention the fact that the circulation of the slag floating on the metal, which in my experience is generally towards the incoming gas, apparently in this case ceased altogether, or, if there was any circulation, it was in the same direction as the gas in the furnace.

The experiments show conclusively that gas of the composition given is entirely satisfactory for the manufacture of the softest kinds of steel, and that it does not contaminate the metal with sulphur.

In the following table, No. 1 is the analysis of the Mond gas, taken before it entered the regenerative chambers; No. 2 is the analysis of the same gas after it had passed the regenerator and been heated. The comparative calorific value is given in each case. Average analysis of ordinary Wilson producer gas, which is being employed continually for the manufacture of steel before entering the regenerator, and of the same gas after it has passed the regenerator and been heated, have been given before. The great difference in composition will be noted. In the Mond gas there is a great fall in the percentage of hydrogen, and a rise in the carbonic oxide, while the carbonic acid has been materially reduced. In the ordinary producer gas the reverse takes place as far as the hydrogen is concerned, the carbonic oxide is increased, while the marsh gas and carbonic acid are diminished. It seems probable in the case of the ordinary producer gas that the hydrogen is partly increased at the expense of the decomposition of the marsh gas and olefines, and that the carbonic oxide is increased by the decomposition of part of the carbonic acid by liberated carbon from the decomposed hydrocarbons. The results I have placed before you are the average of those obtained by two separate chemists. Both agree within the limit of experimental error.

The alteration in producer gases on heating is a question that requires further consideration. It would seem as though there is a tendency to form one composition at which producer gases most easily maintain themselves when highly heated, the composition of the Mond gas after heating and the Wilson gas after heating being somewhat similar.

	Mond Gas.		Wilson Gas.	
	No. 1.	No. 2.	No. 1.	No. 2.
	Before Regenerator.	After Regenerator.	Before Regenerator.	After Regenerator.
Carbonic anhydride ..	17.8	10.5	7.63	5.19
Carbonic oxide	10.5	21.6	21.73	24.79
Ethylene	0.7	0.4	1.06	.41
Methane	2.6	2.0	3.05	1.33
Hydrogen	24.8	17.7	12.60	19.17
Nitrogen	43.6	47.8	53.80	48.98
	100.0	100.0	99.87	99.87

Calorific value 1430 1444 1487 1524

It has been frequently stated, and I believe the late Sir William Siemens held the opinion, that non-luminous gas would not work satisfactorily in the steel furnace. Before heating, the Mond gas burns with a non-luminous flame. In the steel furnace, however, the men found no difficulty in working with the gas, and it seemed in practice when highly heated to burn with a brilliant white flame. Possibly the change in composition in the regenerators which has been spoken of may have something to do with this, as in every case examined the gas contained finely divided carbon, which was deposited on the walls of the apparatus. To show, however, that a steel furnace will work satisfactorily with what is generally known as non-luminous gas, I would instance the furnace at the Trimsaran Works in South Wales. Here the gas, I am informed, is made from anthracite coal, and is certainly before heating a non-luminous gas. I may say, in conclusion, that the comparative calorific values in this paper have all been calculated; they are in the terms of kilogramme-centigrade calories; they are, therefore, not absolute, but comparative. Great care was exercised in making the various analyses given, and they are in almost all cases the average of a large number made.

PROVINCIAL SHARE MARKETS.

THE CORNISH MINE SHARE MARKET.

Mr. MICHAEL WILLIAMS BAWDEN, Mining and Assaying Offices, Liskeard, Cornwall, writes (May 21):—Market firmer on favourable result of statistics for middle of the month, showing a further reduction of stocks with an improved tin standard and satisfactory sale on Tuesday; prices are much the same. Quotations:—Basset United (fully paid), 1 to 1½; ditto (5s. paid), 5s. to 6s.; Blue Hills, 1s. to 1s. 3d.; Carn Brea, 9s. to 10s.; Devon Consols, 18s. 6d. to 20s.; Dolcoath (fully paid), 14s. 6d. to 15s.; ditto (7s. 6d. paid), 5s. to 6s.; East Pool, 2½ to 2¾; Killifreth, 7s. to 7s. 6d.; Levant, 4 to 4½; Polberro, 7s. to 8s.; South Crofty, 4s. to 5s.; Tincroft, 10s. to 11s. 6d.; West Kitty, 2 to 2½; Wheal Grenville, 6 to 6½; Wheal Kitty, 4s. to 5s.

Messrs. ABBOTT AND WICKETT, Stock and Share Brokers and Mining Share Dealers, Redruth, write under date of May 21:—A somewhat better feeling has prevailed this week, but business has been very limited. Killifreth has improved to 7s. 6d., and Dolcoath have been enquired for. Quotations herewith:—Blue Hills, 1s. to 2s.; Basset Mines, ½ to 1½; Carn Brea, ½ to 1; Dolcoath (fully paid), 14s. to 15s.; ditto (7s. 6d. paid), 5s. to 6s.; East Pool, 2½ to 2¾; Killifreth, 7s. to 8s.; Polberro, ½ to ¾; South Crofty, ½ to ¾; Tincroft, ½ to ¾; West Kitty, 2 to 2½; Wheal Grenville, 5½ to 6; Wheal Kitty, 1s. 6d. to 2s. 6d.; Wheal Metal (3s. paid), 8s. 6d. to 4s.

MANCHESTER.

Messrs. JOSEPH B. and W. P. BAINES, Stock and Share Brokers, Queen's Chambers, 7, Market-street, write, May 21 (noon):—Business during the past week, at any rate so far as the foremost markets are concerned, has been on an exceedingly small scale, the near approach

of the holidays, coupled with the fact that the settlement immediately ensues, having served to deter operators. The demand for investment stocks continues, and several Corporation issues show improvements ranging from 1 to 3 per cent. in sympathy with the improvement in Consols, which are ½ better on the week. English rails have been strong on prospects of good holiday traffic together with investment purchases, Great Western being in particular request at a rise of ¾. Canadians and Americans lower all round, the single exceptions being Canada Pacific and Ontario, which are ½ and ¾ better respectively; but on the other hand the declines are of small consequence, prices having moved within narrow limits. Mexican railway issues are also easier. In foreign movements are a trifle contradictory, as will be seen from movements recorded hereunder. An important feature of the market continues to be for all kinds of dividend-paying securities.

ENGLISH RAILS.—Higher: Coras, ½; Great Eastern, ½ to ¾; York A, ½ to ¾; Great Western, ¾; Leeds, 1; London, ¾; District, ¾; Midlands, ¾; North British, 1½; Berwick, 1½.—Lower: Chatham, ¾; Sarat, ½ to ¾; Dover A, ½ to ¾.

CANADIAN AND AMERICAN.—Higher: Canadian Pacific, ¾; Ontario, ¾.—Lower: Aitchison Ordinary, ½; ditto Income Bonds, ½; Trunk First Preference, ¾; ditto Second Preference, ¾; Mexican Rail, ½; ditto First Preference, ¾; ditto Second Preference, ¾; Central Pacific, ½; Milwaukee, ¾; Denver Preference, ¾; Louisville, ¾; New York Central, 1; Norfolk Preference, ¾ to 1; R. A. Lings, ¾; Union Pacific, ¾; Atlantic First, ¾.

CONSOLS.—Higher: Two and Three-quarter per Cent., ¾.

COLONIAL STOCKS, &c.—Higher: New South Wales Inscribed, ¾; New Zealand Inscribed, ¾; Victoria Inscribed, ¾.

CORPORATION STOCKS AND DEBENTURES.—Higher: Blackburn Four per Cent., 2; Hull Three and a-half per Cent., 1; Newcastle Three and a-half per Cent., 3.

FOREIGNERS.—Higher: Argentine Five per Cent., ¾; Portuguese Three per Cent., ¾.—Lower: Argentine Six per Cent., ¾ to 1; Brazilian Four per Cent., ¾; Egyptian Unified, ¾; Russian Four per Cent., ¾; Turkey D, ¾; Uruguay Three and a-half per Cent., ¾.

BANKS.—Higher: Adelphi, ¾; Lancashire and Yorkshire, ½ to ¾; District, ¾; National Provincial, ¾; Oldham J. S. Bank, ¾.—Lower: Imperial Ottoman, ¾.

INSURANCE.—Higher: Guardian, ½ to ¾.—Lower: Lancashire, 5-16; London and Lancashire, ¾; Manchester Fire, 3-16; Maritime, 1-16; Royal, ¾.

COAL, IRON, &c.—Higher: Bolckow, fully paid, ¾; Tredegar "A," 1-16 to 3-16.—Lower: R. Evans "A," ¾.

TELEGRAPHS AND TELEPHONES.—Lower: Anglo-American, 1; National Telephone, 5-16.

BREWERS.—Higher: Allsopp's, 5; Manchester, ½ to ¾; Parker's, 1; Taylor's Eagle, ½ to ¾; Threlfalls, ¾.—Lower: Bent's, ¾ to 1.

MISCELLANEOUS.—Higher: Bradbury's, 2; Brooks Bond, ¾; Bryant and May, ¾; Chadwick's, 1½ to 1¾; Cross's, ¾; Canard Steam, ¾; Fowler Brothers, ¾; Manchester Commercial Buildings, ¾; Pacific Steam, ¾; West India and Pacific, ¾; Gas Light A, 5; Manchester Trust, 6d. to 1s.—Lower: Blackpool Tower, 6d.; Blackpool Winter Gardens, ¾; Coats, 2½; Henry's, 1-16 to ¾; Howard and Bullough, ¾; Lever Brothers Preference, ¾; Liverpool United Tramways, ¾; United Alkali, 1-16; Sir J. Whitworth's, ¾ to 1.

LATER (4 p.m.).—Home rails have been in strong request all day, and some decent improvements are recorded, Canadian Pacific are also 1 per cent. better, but American and Grand Trunk issues have been neglected, and are a shade easier.

SCOTCH MINING AND INDUSTRIAL COMPANIES SHARE MARKETS.

STERLING.—Mr. J. GRANT MACLEAN, Stockbroker and Ironbroker (May 21), writes:—During the past week the markets have been quiet, partly owing to the approaching Whitsuntide holidays.

In shares of coal, iron, and steel companies, prices do not show much alteration. The Arncliffe Coal Company announce an interim dividend of 12s., which compares with 20s. at this time last year. Stewart and Clydesdale have been in favour on trade prospects, and touched 13 15-16. Broken Hill are at 3s.; Marbella, 40s.; Steel Company of Scotland, 5.

In shares of copper concerns a fair amount of business has been done, and prices are higher on the upward tendency in the market for the metal. Arizona have touched 59s. 9d.; Tinto, 21½; and Tharsis, 24. Central Chilian are at 10s. 6d.; Mount Lyell, 7. Leadhills are at 15s. to 20s.

In shares of gold and silver mines there has been more business doing, especially in West Australians. More attention is being attracted to this market, as development is being pushed on. On the other hand, dealings are restricted in South Africans, owing to the unsatisfactory position of affairs with the Transvaal Government. Chartered have only varied from 61s. 3d. to 65s. 6d. Consolidated Gold Fields, however, declined to 11 7-16. East Rand, Randfontein, and Sheba show little alteration. Indian mines continue in favour, especially Champion Reef, Mysore, and Nundydroog. Malacate shares offered. Afrikaners are at 27s. 6d.; Associated Western Australian, 52s. 6d.; Achilles, 2s. 9d.; Blackett's Claim, 9s.; Big Blow, 14s.; Broken Hill, 50s. 9d.; Black Flag, 17s. 6d.; Charterland, 12s. 6d.; Cassidy Hill, 26s. 6d.; Croesus South, 46s.; Eastleigh, 23s.; Emma, 2s. 3d.; Gold Coast, 3s. 9d.; Gold Creek, 3s. 3d.; Glinberg, 40s.; Gold Estates of Australia, 55s.; Gwelo, 2s.; Golconda, 14s.; Heidelberg Estate, 18s. 6d.; Hainault, 39s.; Hitor Mine, 40s.; Hall Mines, 38s. 9d.; Hannan's Golden Group, 30s. 6d.; Idaho, 5s. 6d.; Kalgurlie Great Western, 4s.; Klerksdorp, 15s. 3d.; Kathleen, 4s. 3d.; Lake View South, 45s.; Mount Charlotte, 40s.; Mount Rowe, 27s. 6d.; Marchion New Chums, 9s.; Marchion Diamond, 13s. 6d.; Mashonaland Agency, 44s. 6d.; Noltyskop, 1s. 9d.; North Boulder, 21s. 3d.; O to's Korje, 6d.; Paddington Consols, 34s. 6d.; Pestarena, 8s. 3d.; Rhodesia Mining and Finance, 23s. 9d.; Rhodesia (Limited), 20s. 6d.; Sam's Wealth of Nations, 5s. 9d.; Sherlaw's, 14s. 3d.; Town Properties W.A., 27s.; Umali, 7½d.; Wealth of Nations, 35s.; and Waterfall Estate, 12s. 6d.

In shares of miscellaneous companies prices are steady. The Pomphreton Oil Company announce a dividend of 5 per cent. on Ordinary shares. Broxborn are at 10½; and Young's Oil, 34s. Cheshire Alkali Deferred are at 25s., and Law's Chemical, 6½. Nobel's Explosives have been selling between 18½ and 17 15-16.

EDINBURGH.

Messrs. THOMAS MILLER and SONS, Stock and Share Brokers, 69, Hanover-street, Edinburgh, report as follows under date of May 21:—Since last weekly report Caledonian Deferred and North British have had a turn of weakness, on fears that the threatened labour difficulties in the North of England might spread to the Clyde, but prices promptly recovered on a settlement of the dispute being effected. There have been considerable dealings in both stocks, which have risen, the former from 62½ to 63 3-16, and the latter from 50 to 51½. Glasgow and South Western Ordinary have advanced from 129½ to 132. Alliance Assurance shares have risen from 10½ to 11, Scottish Union A from 91s. to 91s. 6d. Standard have further fallen from 57 to 55, North British and Mercantile from 39½ to 38. Bankstocks have been very firm. Bank of Scotland has gone up from 348 to 352, British Linen from 412 to 418, Clydesdale from 20 to 20½, Royal from 228 to 228½, Union from 21½ to 22 3-16. Steel Company of Scotland shares have risen from 97s. to 98s. 9d. Wilson's and Clyde from 8½ to 8 15-16, Stewart and Clydesdale from 12½ to 13 7-16. Broken Hill have changed from 51s. 6d. to 50s. 9d. Broxborn Oil have gone down from 10 13-16 to 10½. Hermand have risen from 1s. 3d. to 2s. 3d. J. and P. Coats have declined from 4½ to 4 3-16.

The usual quarterly dividend at the rate of 2s. per share, free of income-tax, will be paid by the WAHAI GOLD MINING COMPANY (LIMITED) on June 8 next, and the warrants for same will be posted on June 6. The transfer books will be closed from the 1st to the 6th June inclusive for the preparation of the dividend warrants.

WANTED.

* Prepaid Advertisements are inserted in this column at the rate of 8d. per line, with a minimum charge of 4s.

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STATE OF THE SKILLED LABOUR MARKET.

THE following memorandum has been prepared by the Labour Department of the Board of Trade for the Board of Trade Journal, and also (with additions) for the Labour Gazette:—During April the general state of employment continued to improve, and at its close the proportion of unemployed in trade unions making returns was lower than at any time since June, 1891. In the 109 trade unions, with an aggregate membership of 416,741 making returns, 13,480 (or 3·2 per cent.) are reported as unemployed at the end of April, compared with 3·5 per cent. in March, and with 6·6 per cent. in the 84 unions, with a membership of 386,627, from which returns were received for April, 1895.—Coal Mining. Employment in this industry was better than a year ago, and fully equal to the previous month, after allowing for the Easter holidays. The average number of days worked by 1141 pits, employing 327,047 workpeople, was 4·69 per week, as compared with 4·81 in March and 4·46 in April, 1895. The proportion of unemployed miners in trade unions in Northumberland and Durham fell from 2·0 per cent. at the end of March to 1·9 per cent. at the end of April. In April, 1895, the percentage was 5·6.—Iron Mining. Employment in this industry continues better than a year ago. At the mines included in the returns an average of 5·64 days per week was worked during April, as compared with 5·39 in April, 1895. The total number employed at the mines was 16,319, or about 650 more than a year ago. In the pig iron industry the state of employment in April last was more satisfactory than in March, and shows a marked improvement compared with April, 1895. The 107 ironmasters who made returns had 343 furnaces in blast at the end of April last, as compared with 339 in March, and 301 in April, 1895. The number of workpeople employed at these furnaces increased by 72 compared with March, and by 1897 as compared with a year ago. Employment at steelworks is still considerably better than a year ago. The number of workpeople employed at the 111 works included in the returns was 33,516 at the end of April, or 15·8 per cent. more than at the end of April, 1895. At the 88 puddling furnaces and rolling mills making returns, fewer workpeople were employed than at the end of March, but more than a year ago; at the end of April the number employed being 17,593, as compared with 17,698 at the end of March, and 17,321 at the end of April, 1895. The tinplate trade is very unsettled, and shows but little improvement as compared with March. At the 89 works included in returns received, 288 mills were working at the end of April, as compared with 286 at the end of March. Of the 89 works, 42 only were giving full employment. A further improvement has taken place in the engineering and kindred trades, and the percentage of unemployed union members has fallen from 2·9 in March to 2·3 at the end of April, compared with 7·2 in April, 1895.

Trade Disputes.—The number of fresh disputes occurring in April was 84, as compared with 95 in March and 83 in April, 1895. 18 in the engineering and shipbuilding trades, 13 in the mining and quarrying industries, 10 in the metal trades, and six in the miscellaneous group of industries. In 73 of the disputes 8572 workpeople were involved. Of the 70 disputes, old and new, involving about 7000 persons, of which the settlement has been reported, 39, involving about 3100 persons, resulted in favour of the workpeople; 11, involving 902, in favour of the employers; and 17, involving 2600, in a compromise; the results of the remaining three, involving 424 persons, being indefinite.

Changes in Rates of Wages and Hours of Labour.—About 116,000 workpeople were affected by changes in rates of wages, about 81,000 receiving increases and 35,000 sustaining decreases. The effect of all the changes was an average advance estimated at 11d. per week upon the wages of the total number affected. The increases were mainly in the building and engineering and shipbuilding industries. The decreases reported affected 31,500 miners in Northumberland, and 3850 tin-plate workers in South Wales. The 12 cases of reduction in hours of labour affected 2676 workpeople, all of whom had their hours of labour shortened. Of this number 381 had their working hours reduced to 48 per week.

TIN TICKETING.

THE fortnightly ticketing for tin ores was held at Tabb's Hotel, Bedford, on Tuesday. Result:—

VALUES OF ORES SOLD FROM EACH MINE.				
Mines	Tons cwt.	Per ton.	Value.	
		£ s. d.	£ s. d.	
Dolomath No. 1	14 0	37 7 6	523 5 0	
do No. 1a	14 0	37 10 0	525 0 0	
do No. 1b	12 0	37 12 6	451 10 0	
Wesol Grenville A	16 0	39 0 0	624 0 0	
do B	16 0	38 15 0	620 0 0	
do No. 2	4 0	23 0 0	92 0 0	
East Pool A	10 0	26 7 6	263 15 0	
do B	9 0	25 17 6	232 17 6	
do No. 2	1 10	11 12 6	17 8 9	
Tincoft	9 0	33 5 0	299 5 0	
do	9 0	33 10 0	301 10 0	
Basset Mines (Limited)	17 0	39 7 6	669 7 6	
Corn Brea No. 1	8 0	34 5 0	274 0 0	
do No. 1a	8 0	34 7 6	275 0 0	
do No. 2	1 0	20 10 0	20 10 0	
West Killy	13 0	39 2 6	508 12 6	
Phoenix United	9 0	38 12 6	347 12 6	
do No. 2	1 0	29 10 0	29 10 0	
Wesol Killy	8 0	38 12 6	309 0 0	
South Condarrow	6 0	39 7 6	236 5 0	
185½			£6620 8 9	

AVERAGE PRICE PER TON, £35 13s. 9d.

AVERAGE PRICES PER TON.

	£34 12 0	May 5	£33 14 10
April 8			
April 21	34 17 2	May 19	35 13 9

VALUE OF ORES PURCHASED BY EACH FIRM.

	Tons.	£ s. d.
Carvedras	29 0	1059 16 3
Chyndour	51½ 0	1889 1 3
Williams	26½ 0	987 17 6
Bedruth	11 0	416 2 6
Ponpoll	3 0	66 10 0
Cornish	64½ 0	2201 1 3
185½		£6620 8 9

The offices of the HOLCOMBE VALLEY COMPANY (LIMITED) are now at 31 and 32, King William Street. The list of applications for shares in the TRENT CYCLE COMPANY (LIMITED) closed on Tuesday, May 19, at 4 p.m. for both town and country. The list of applications for the £600,000 4½ per cent. consolidated mortgage bonds of the ANGLO-CHILIAN NITRATE AND RAILWAY COMPANY (LIMITED) closed on Wednesday, May 20, for both town and country.

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A New Guide to the Iron Trade, or Mill Managers' and Stock Takers' Assistant. By JAMES ROSE, of Bateman's Hill Iron-Works, Second Edition. Comprising a Series of New and Comprehensive Tables, practically arranged to show at one view the Weight of Iron required to produce Boiler Plates, Sheet Iron, and Flat, Square, and Round Bars, as well as Hoop or Strip Iron of any dimensions, to which is added a variety of Tables for the convenience of Merchants, including a Russian Table. 5s. 6d.

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Lisimore Castle (via Madeira) ...	June 5	June 6
Dunottar Castle (via Madeira) ...	June 12	June 13
Warwick Castle (via Madeira and St. Helena) ...	June 19	June 20

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† Guelph (twin screw) ...	—	June 1	June 6	June 13
† Tartar ...	—	—	—	June 20

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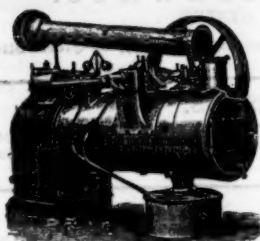
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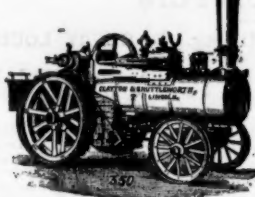
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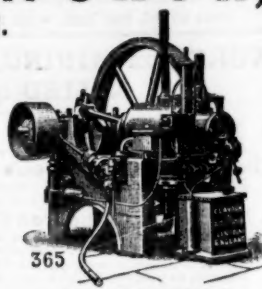
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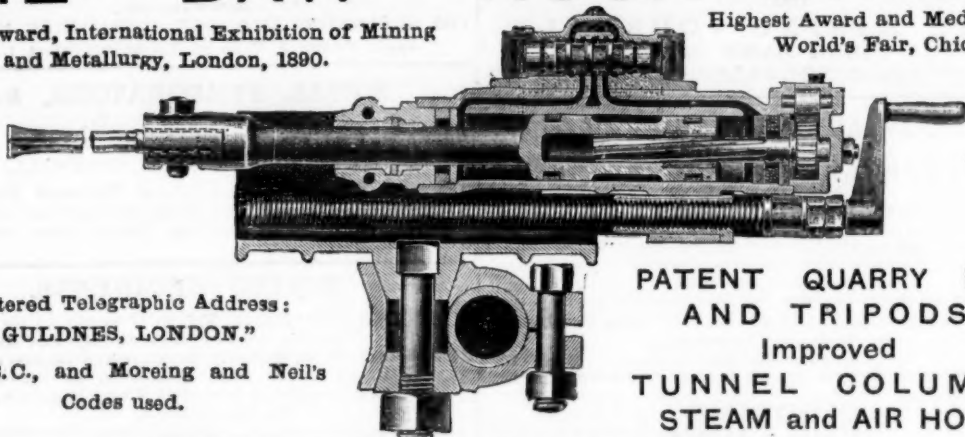
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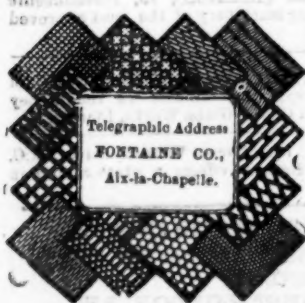
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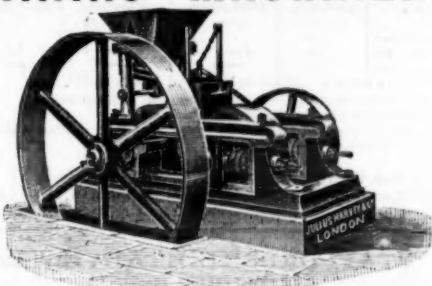
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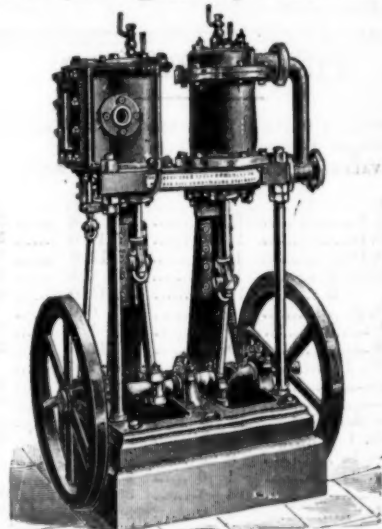
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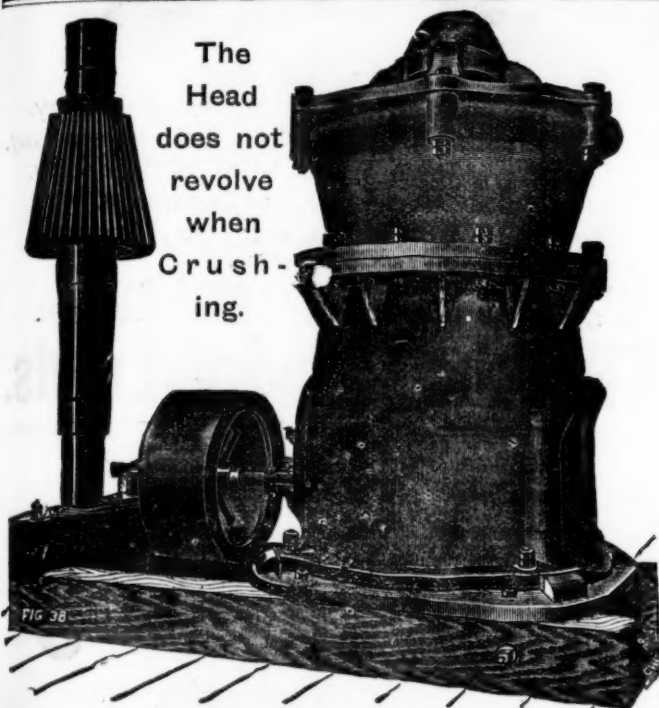
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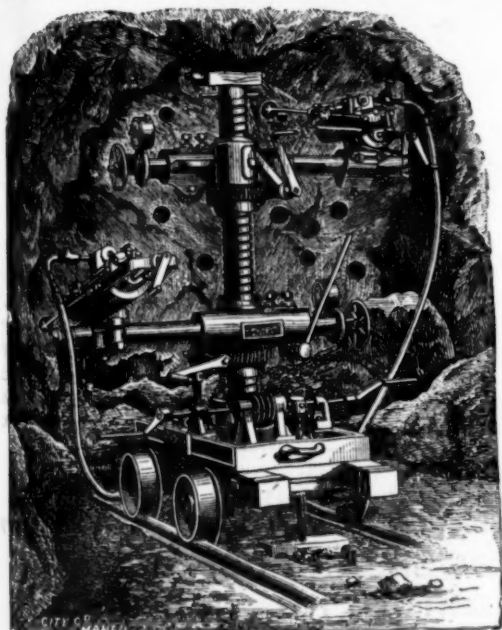
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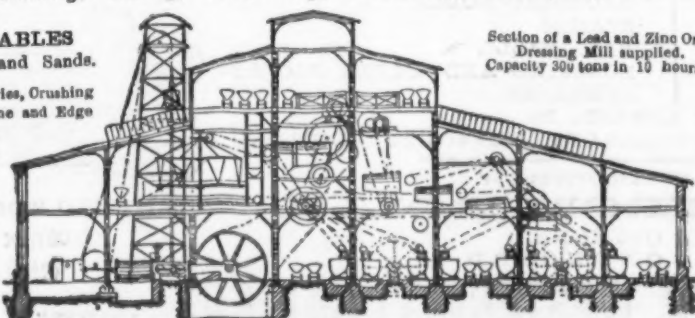
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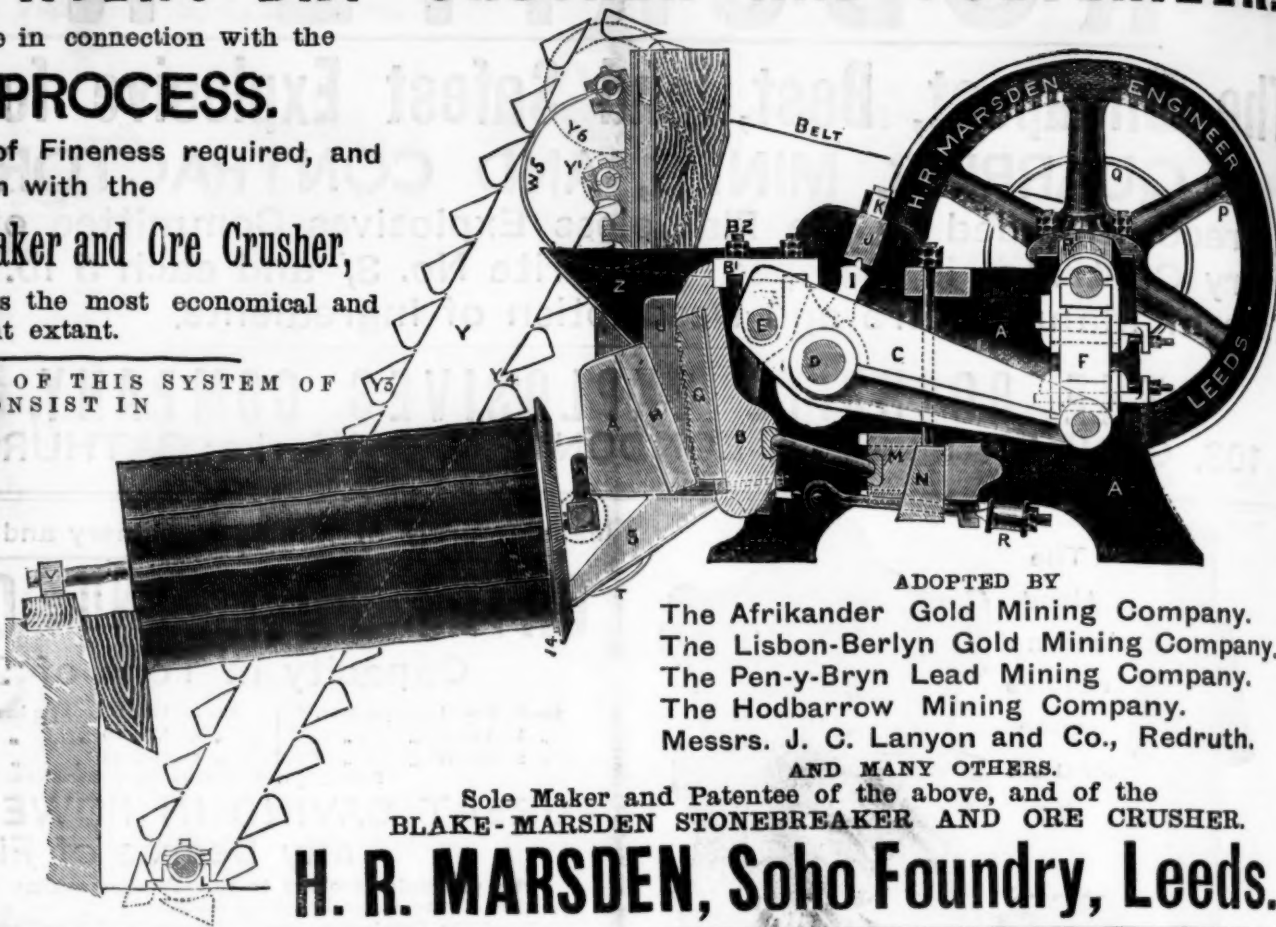
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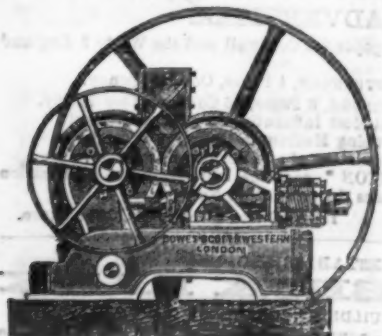
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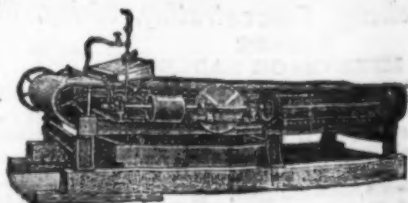
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